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THE

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WITH THE ASSISTANCE OF

GENTLEMEN EMINENT IN SCIENCE AND LITERATURE.

IN EIGHTEEN VOLUMES.

VOLUME III.

BIBLIOTHECA BODLEIANA

EDINBURGH:
PRINTED FOR WILLIAM BLACKWOOD;
AND JOHN WAUGH, EDINBURGH; JOHN MURRAY; BALDWIN & CRADOCK;
J. M. RICHARDSON, LONDON; AND THE OTHER PROPRIETORS.

M.DCCC.XXX.

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THE

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ASTROPHANOMETER, another name given by Jeaurat to instruments resembling the Astereometers or Astrometers of Jeaurat and Dr Brewster, described under the last of these articles. (*o*)

ASTRUC, John, M. D. a very eminent French physician, who was born at Sauve, a town of Lower Languedoc, on the 19th of March 1684, and died at Paris the 5th of May 1766, at the advanced age of 82. He completed his education at Montpellier, and in 1702 obtained from that university a bachelor's degree in medicine. Soon afterwards he distinguished himself in a controversy with the mechanical physicians on the subject of digestion, which he considered to be the effect of a peculiar ferment, and not of trituration, as Pitcairn and others had obstinately maintained. He obtained in 1710 the professorship of anatomy and medicine at Thoulouse; and in 1716, he succeeded to the chair become vacant at Montpellier by the death of Chatelain. His reputation for learning and medical skill was here fully established; and in 1729 he was invited to remove to Poland, where he was appointed physician to Augustus II., but he very soon quitted that court, and returned to France. He now fixed himself at Paris, and so early as 1730 he was made consulting physician to the French king, and on the death of Geoffroy he received the appointment of professor of medicine in the Royal College. He became also doctor regent of the faculty of physic at Paris. Astruc merited these honours: he was unquestionably a man of great learning, a distinguished writer, and a very skilful physician; his celebrity as a teacher drew to Paris a crowd of pupils from all parts of Europe, and his work *De Morbis Venereis*, published in 1736, everywhere established his fame as an author. His *Traité des Maladies des Femmes*, published in 1761, also possesses great merit. His other acknowledged works are: A dissertation *De Motus Fermentativi Causa*, 1702; *De Hydrophobia*, 1720; *Sur l'Origine des Maladies Epidemiques*, 1721; *Memoires pour l'Histoire Naturelle de Languedoc*, 1737; *Tractatus Pathologicus*, 1745; *Tractatus Therapeuticus*, 1748; *Traité des Tumeurs et des Ulceres*, 1759; *Conjectures sur les Memoires Originaux dont il paroit que Moise se servit pour composer le livre de Genese*, 1759; *Art d'Accoucher reduit à ses principes;* and published after his death by Lorry, *Memoires pour servir à l'Histoire de la Faculté de Medicine de Montpellier*. (*p*)

ASTURIAS. Two provinces on the north of Spain, containing about 700 square leagues of the most mountainous country of the whole monarchy, form what is called the principality of Asturias. According to some writers, these two provinces are to be considered separate and distinct, one being the Asturia of Oviedo, and the other the Asturia of Santillana; but no such division is recognised in the administration of the kingdom. This principality is bounded on the north by the Bay of Biscay; by Gallicia on the west; and by the kingdoms of Leon and Old Castile on the south and east.

Boundaries.

Climate.

The climate is excessively humid; and no care can preserve grain or fruit from decay, and iron from rust. The atmosphere is continually surcharged with vapour which is attracted by the mountains, and unless the wind blows from north-east, the sky is covered with clouds.

Natural history.

The whole principality abounds with marl, chalk, gypsum, and very fine marbles. The limestone is full of fossil shells, coral, and corallines. Amber, independent of being found on the shore, exists in a fossil state, uniformly accompanied by jet, and a kind of cannel coal. These, when broken, disclose white crusted nodules, including bright and transparent amber. There is abundance of coal deposited in a calcareous bed, which has never been worked for fuel, both because plenty of wood can easily be procured for that purpose, and because it emits an intolerable odour in burning. There are also strong prejudices entertained against it, as being injurious to health. The ancients, particularly Pliny and Silius Italicus, speak of the gold of the Asturian mountains, but none is known now to be there. Mines of copper, lead, and iron, are found; and likewise those of arsenic and cobalt.

Woods, consisting of elm, ash, and poplar, cover the hills. Many trees fit for domestic purposes, or useful in ship building, particularly oaks of very fine quality, abound; and fruits are produced in sheltered places without care or cultivation.

The cattle of the Asturias grow to considerable size: they universally supply the place of horses for agricultural uses. Martial and Silius both speak of the Asturian horses. It does not appear, however, that they are at this day equally celebrated.

Population.

The Asturias contain a bishopric, 668 parishes, 23 monasteries and nunneries, and 13 other religious establishments. The total population is about 350,000 persons. Besides dignitaries of the church, the number of religious, including 200 nuns, is 2858, which is less in proportion than in some other parts of Spain.

Diseases.

From the nature of the climate, the mode of life pursued, and certain predisposing causes, the people are subject to many severe diseases, such as fevers, dropsy, scrofula, palsy, leprosy, and others. The *mal de rosa* attacks the back of the hands, the insteps, and the neck, where it descends to part of the breast, but leaves the rest of the body free. At first it appears red, attended with pain and heat, and ends in scurf. Vertigo and delirium succeed in the progress of the disease, and another extraordinary symptom, consisting in a peculiar propensity of the patients to drown themselves. The disease disappears in summer, and returns in spring: it may be cured by gentle medicines, but if neglected, terminates in scrofula, marasma, melancholy, and insanity. The inhabitants are also grievously afflicted with leprosy, for which there are no less than 20 hospitals in the Asturias. Some labouring under it are covered with a dry white scurf, and look like so many millers: some have the skin almost black, full of wrinkles, and covered with a loathsome crust: some have one leg and thigh swollen to an enormous degree, with many pustules and ulcers; while in others, especially women, the swelling seizes one hand or the face, and hardly leaves the human features discernible. Certain patients, again, amidst the variety which this disease assumes, have carbuncles as large as hazel nuts all over the surface of the body.

State of the peasantry.

Formerly the lower classes were in a condition but little better than bondage. Now, however, they are not *adscripti glebæ*, because a great portion of the peasantry abandon their native soil in quest of employment, and are absent even for whole years. During the interval, the ground which they would have had to labour, is cultivated by their wives. An indulgence is shewn to tenantry here, of which we have hitherto found no example in other countries, and which we can scarce reconcile with our notions of the right of property in land. A landlord in the Asturias, as elsewhere, could remove his tenants at the expiry of their leases; but a royal ordinance interposed in the year 1755, stating, that the principal cause why agriculture declined was the unlimited power of landlords to eject their tenants at the termination of their leases: and it declared, that thenceforward, if a farmer cultivated his lands properly, and was in no considerable arrear, he should neither be removed, nor have the rent raised. Both landlord and tenant were empowered to appeal to skilful persons, in order that the value of the farm might be ascertained; or to fix the compensation which a tenant on quitting it should receive for the improvements he had made. The chief estates of the Asturias are said to be in the hands of 80 families, and those of the next degree belong to the clergy.

Agriculture.

The great extent of surface occupied by mountains, limits the quantity of agricultural produce; nevertheless wheat, rye, barley, and maize, are cultivated with success, and another kind of corn called *escanda*, affording white flour of good quality. Two crops in one year are obtained from the low lands, in which case barley follows either maize or flax. But the operations of the peasantry are rude and unskilful. Their ploughs are ill constructed, being adapted only to scratch the ground, which rather requires a deep furrow; and their harrows have no iron. These are used only for maize, as the wheat and barley never undergo harrowing. Their cart wheels are made of planks, and are fashioned without spokes; and the axles, to which no grease is applied, are eight or ten inches in diameter. An immoderate degree of friction, produced by such a clumsy apparatus, is increased by the most injudicious expedients. In some of the ravines of the mountains, horizontal water wheels are seen driving the mills. Very considerable quantities of fruit are gathered throughout the principality, and much cyder is made from the apples. This is maintained to be inferior to English cyder, for two reasons: first, because the inhabitants neither pay sufficient attention to the proper selection of fruit, nor to the treatment of the liquor; and secondly, because its quality is impaired by the extreme humidity of the climate. There are some vineyards, but no wine is made from their produce. Though the Asturias chiefly consist of successive mountains, there are several extensive pastures, grazed by numerous flocks of sheep and cattle.

Commerce.

The whole commerce of the Asturias is inconsiderable: the imports are linen, woollen stuffs, and hardware goods; the exports, fruit, cyder, and millstones. There are eighteen sea-ports on the coast, some of them so unimportant as hardly to be known by name. They send out shipping to France and England for articles which the province requires. Formerly their whole trade was engrossed by the Dutch, but is now partitioned among other countries. The difficulty of intercourse with the rest of Spain, undoubtedly restricts the commerce of the Asturias; and the roads in general are represented as frightful. There is only one great road leading from Madrid to Oviedo, which traverses this principality: the rest are bye roads, many of them almost impracticable even by a foot passenger. A road runs along the coast forty leagues, or nearly the whole length of the principality. In its course the traveller has to pass thirty-one rivers, only ten of which have bridges. Five of these are crossed in boats; the remainder must be forded. The dangers of attempting this road on horseback, can be but imperfectly conceived. Sometimes the traveller finds himself on the summit of lofty mountains, then in dark and narrow vales; next buried in the thickest woods, or journeying along the edge of naked precipices. But to compensate for his difficulties, the true picture of the country is disclosed to his view, here consisting of hills whose tops are covered with snow, while the greenest pasture is seen below; and there of rocks, cascades, and natural fountains, or fields in a rich state of cultivation.

Remains o antiquity.

There are several edifices of Gothic architecture in the Asturias. Not far from Caugas de Onis, is the monastery of St Peter Villanosa, said to occupy the site of a palace belonging to Alphonso I. the son of Favila, prince of Oviedo. Here there is a Gothic arcade, exhibiting proofs of great antiquity, which is reputed to have been the entrance to the chapel of the palace. At the gate of the church are sculptured the tragical incidents attending the death of the prince Favila, who while hunting was torn to pieces by a wild boar, in 738. Roman antiquities have been found near Gijon.

ory.

In regard to the history of the Asturias, it appears that the Romans made ineffectual attempts to subdue them. Florus describes a great body of Asturians descending from the mountains, and boldly attacking the Roman camp. The engagement was long and bloody, and the victory uncertain. When the Moors struggled for the conquest of Spain, and gained a decisive battle at Xeres de la Frontera, in 711, the Asturians received Pelayo and the other Christians, who escaped the force of their arms. The Moors found an impenetrable barrier in the mountains surrounding this province. Their cavalry, which contributed so much to their successes in the low countries, was of little use; and after being exposed to various attacks from the Asturians, they judged it expedient to retreat to a distance from the mountains. Pelayo, protected by their fastnesses, here laid the foundation of the Spanish monarchy; his posterity waged constant war with the Moors, but it was only after a contest of several successive centuries, that they were able to effect their expulsion. From that æra the Asturians derived those privileges of nobility which they still retain: the inhabitants of Ansena are distinguished from the rest of their countrymen, by the title of *Illustrious Mountaineers.* The two provinces of Asturias were erected into a principality, and the oldest son of the Catholic king, under the late dynasty, has from the year 1388 bore the title of Prince of Asturias.

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The character of the Asturians seems formed, in a great measure, from local circumstances. Extreme simplicity of dress and manners prevail: the women use no artificial decorations, trusting only to what nature has bestowed. The people are distinguished for honour, probity, and candour; every thing bespeaks their remoteness from the more sociable and civilized districts of the kingdom: they are warmly attached to their country, faithful to their rulers, and passive to the laws. They are zealous, perhaps it may be affirmed superstitious, in matters of religion; and inherit a degree of courage frequently the characteristic of mountaineers. Dishonesty is said to be quite unknown among them. Yet notwithstanding such qualifications, they are accused of dullness, and the want of vivacity, which we may probably ascribe to the interrupted intercourse subsisting between those who dwell in wild and uncultivated regions. However, they should probably prize their situation, though the source of so many disadvantages, as it removes them from the impression of those convulsions to which a province more populous, civilized, and accessible, would be exposed.

The state of the sciences is at the lowest ebb in the Asturias: medicine in particular, as now practised, is less calculated to effect a cure than to endanger life. Hence a modern author, in speaking of the frequency of palsy, observes, "The physician has such a dread of palsy, that he bleeds his patient into a dropsy, or leaves him to languish between life and death, a prey to the most gloomy of all diseases to which humanity is subject." See Bourgoing *Tableau de l'Espagne Moderne*, tom. 2. p. 162. Townsend's *Travels in Spain*, vol. i. ii. Laborde's *View of Spain*, vol. ii. Bleau's *Atlas*, tom. 3. Mariana *Historia de Espana*. (*c*)

ASTYAGES, the last king of Media. See *Herodotus*, lib. i. cap. 74, 75; *Pausanias*, lib. v. cap. 10; *Justin*, lib. v. cap. 4; and *Univers. Hist.* vol. v. p. 40, 47, note (C); 170, (B), &c. See also MEDIA and PERSIA. (*w*)

ASTYANAX, the son of Hector and Andromache, who was saved by his mother from the flames of Troy. His superiority to Hector having been predicted by one of the soothsayers, the Greeks are said to have determined his destruction, and Ulysses to have precipitated him from the Trojan walls. See the *Iliad*, lib. vi. v. 400, lib. xxii. v. 500.; the *Æneid*, lib. ii. v. 457. lib. iii. v. 489; and Ovid's *Metamorph.* xiii. v. 415. (*o*)

ASYLUM, from the Greek *ασυλον*, sanctuary, or place of refuge. See SANCTUARY, where this subject will be discussed at some length. (*j*)

ASYMPTOTE, is a line which, being indefinitely produced, continually approaches another line also indefinitely produced, so that the two lines never meet, though their distance may be less than any assignable magnitude. See CONIC SECTIONS and CURVES. (*o*)

ATAHUALPA, one of the kings of Quito. See Robertson's *History of America*, vol. iii. p. 29; and QUITO. (*w*)

ATALANTIS. See ATLANTIS.

ATE, from *ατaω*, the same as the goddess of discord among the Latins. She was regarded as the daughter of Jupiter, and the author of all evil. She raised such commotions in heaven, that Jupiter dragged her away by the hair, and threw her headlong to the earth. See the *Iliad*, lib. xix. v. 125. (*j*)

ATERGATIS, ATARGATIS, or DERCETO, one of the goddesses of the Syrians, whom they represented like a mermaid, with the head and chest of a woman, but with the rest of the body like a fish. According to some, she was the Babylonian and Assyrian Venus, and, like the Astarte of the Phenicians, had her origin from Semiramis, the foundress of Babylon. See *Strabo*, lib. xvi. p. 748.; Pliny's *Nat. Hist.* lib. v. cap. 23.; Macrobius' *Saturnalia*, lib. i. cap. 23.; Manilius' *Astron.* iv.; and Bryant's *Ancient Mythol.* vol. ii. p. 298. (*w*)

ATHABASCA, the name of a territory, lake, and river, in North America. The inhabitants of this territory carried their furs to Fort-Churchill, Hudson's Bay, till the year 1782; but, since that time, their trading establishment has been on the north side of the river La Pluie, where the inhabitants of Montreal repair to exchange their commodities. See Mackenzie's *Voyages*, Introd. p. 56, &c. (*w*)

ATHAMANES, the name of an ancient people who inhabited Athamania, in Epirus. They seem to have existed a century before the Trojan war, and to have preserved their name and customs in the days of Alexander. It is said that there was a fountain in their territories, the waters of which became so sulphureous during the last quarter of the moon, that they burned wood. See *Strabo*, lib. vii.; *Pliny*, lib. ii. cap. 103.; *Pompon. Mela.* lib. ii. cap. 3.; and Ovid's *Metamorph.* xv. v. 311. (*j*)

ATHAMANTA, a genus of plants of the class Pentandria, and order Digynia. See BOTANY. (*w*)

ATHAMAS, king of Thebes. See *Apollodorus*, lib. i. cap. 7. and 9.; *Pausan.* lib. ix. cap. 34.; Hygin. *Fab.* 1, 2, 5.; and Lempriere's *Classical Dictionary*. (*j*)

ATHANASIA, a genus of plants of the class Syngenesia, and order Polygamia Æqualis. See BOTANY. (*w*)

ATHANASIUS, SAINT, flourished in the fourth century, and was the renowned champion of orthodoxy against the Arians. We have no certain accounts of his parentage; and all that we know of his younger years, is, that he was a native of Egypt, and probably distinguished by his proficiency in theological learning. He accompanied the bishop of Alexandria to the council of Nice, in the capacity of secretary; and though then only a deacon, distinguished himself greatly by his zeal and his eloquence against Arius, and his party. He recommended himself so much to his patron and employer, that, in the year 326, he succeeded him in the see of Alexandria, by his special nomination. He immediately devoted his time and his talents to a zealous support of the catholic doctrine of the Trinity, against the innovations of Arius; and never had any cause a more intrepid advocate. He was five times driven into exile, or forced to abdicate his episcopal see, by the intrigues of his enemies; but his zeal was never diminished by his misfortunes, and he at last triumphed over all his opponents, dying in quiet possession of his see in the year 373. He was first banished by the Emperor Constantine, on the unfounded accusation of detaining at Alexandria the ships which supplied Constantinople with corn. The place of his exile was Treves, in Gaul, where he remained about eighteen months, when he was honourably restored to his see by an edict of Constantius. A council of Arian bishops, held at Antioch, represented this restoration of Athanasius as an encroachment on synodical authority, and confirmed his former deposition. Upon this he fled to Julius, bishop of Rome, and was patronized by the Emperor Constans, who threatened to make war on his brother Constantius if Athanasius was not restored. The eastern emperor complied with this demand; but Athanasius was soon assailed by the violence of his adversaries, and, being again deprived of his episcopal authority, was forced to seek an asylum in the desert of Thebais, where he remained unheard of for the space of six years. He was again restored to his see under Julian, and afterwards banished by the same emperor, to whom he was particularly obnoxious. He was afterwards restored by Jovian, and again banished by Valens; he was finally restored under the latter emperor, and ended his days in tranquillity.

The character of Athanasius is thus drawn by Gibbon, who cannot be supposed partial to his tenets: "Amidst the storms of persecution, he was patient of labour; jealous of fame; careless of safety: and though his mind was tainted by the contagion of fanaticism, Athanasius displayed a superiority of character and abilities, which would have qualified him, much better than the degenerate sons of Constantine, for the government of a great empire. His learning was much less profound and extensive than that of Eusebius of Cæsaria, and his rude eloquence could not be compared with the polished oratory of Gregory, or Basil; but whenever the primate of Egypt was called upon to justify his sentiments, or his conduct, his unpremeditated style, either of speaking or writing, was clear, forcible, and persuasive."

Eusebius Renaudotus, in his history of the *Patriarchs of Alexandria*, has collected all the accounts which oriental writers give of Athanasius; and the celebrated Bernard Montfaucon has published a splendid edition of his works, in three volumes folio. His works consist chiefly of apologies for himself, or invectives against his enemies. The most valuable are, his first book "Against the Gentiles;" "Apologies;" "Letter to those who lead a Monastic Life;" "Letters to Serapion;" "Conference with the Arians," &c. &c. Dupin and Cave have enumerated both the genuine and the spurious works of Athanasius. For an account of what is commonly called the Athanasian Creed, see CREED. See Gibbon's *Hist.* vols. iii. and iv. Lardner's *Works*, vol. iv. (*v*)

ATHANOR, or ACANOR, a species of furnace used by the alchemists in the tedious processes, by means of which they expected to produce the precious from the baser metals. It is derived from αθανατος, immortal, denoting its property of maintaining a long continued heat without attendance, by means of a magazine of fuel connected with it. This instrument is now superseded by furnaces of a more useful kind. (*j*)

ATHAPUSCOW, or SLAVE LAKE, the name of a large lake in North America, about 120 leagues long, and 20 wide. It is variegated with a number of islands covered with trees, and abounds in various kinds of fish. It is connected by rivers with a great number of smaller lakes to the east and north of it, and with the North Sea by Mackenzie's River. According to some maps, it is separate from Slave Lake, and lies to the south of it. N. Lat. 61°, and between the parallels of 112° and 120° west. (*w*)

ATHEISM, (from ἀ priv. and Θεος, *God*,) may be defined to be, the total want of religious principle. The word is generally employed by modern writers to signify, the absolute denial of an Intelligent First Cause. This has been called *pure atheism*. But we conceive, that those who habitually doubt this fundamental doctrine, or who object to all the proofs which have ever been offered in its support, must be considered as subjecting themselves to the same charge, although they may not have arrived at such a degree of hardiness, as formally to avow their unqualified disbelief. Lord Shaftesbury thinks it hard that any man should be pronounced an atheist, whose whole thoughts are not steadily and invariably bent, at all times, and in all circumstances, against every supposition of design in things. For the same reason, no man can be called a theist, who is not uniformly and constantly convinced that an omnipotent mind has produced the universe; and, if this language be admitted, we know not what name to assign to those who fluctuate in their opinions concerning the origin of the world. We cannot form a conception of the incongruous combination which his lordship calls a mixture of theism and atheism,—a co-operation of God and chance.

The appellation Atheist may, we think, be applied, with strict propriety, first, to those who pretend that they are unable to discover any evidences of wise design in the formation of the universe; secondly, to those, who not only withhold their assent, but decidedly maintain, that there are no such evidences; and, thirdly, to those who undertake to account for the origin of things without having recourse to the agency of mind. We would extend the term still farther: To those who have no idea of God at all, if any such persons there be; and also to those whose notions of the creating or superintending mind, are completely incompatible with every definition of Deity which has been given by enlightened reason. He who admits that the world exhibits marks of contrivance, and that inconceivable power must have been exerted in bringing it into existence, but at the same time denies, or refuses to recognise, the *moral attributes* of the Supreme Being, is to be accounted an atheist, inasmuch as he does not believe in a Being possessed of those excellencies, which are as essential to the idea of a Divinity as eternity, ubiquity, and omnipotence. If there be such an opinion as what has been called perfect Dæmonism, the belief in a malignant first principle, we hesitate not to rank it among the modifications of atheism.

Though this is not the usual acceptation of the word, it is sanctioned by many great authorities. The ancient Stoics applied the name Atheists equally to those who acknowledged no God, and to those who thought or spoke in terms repugnant to the divine perfection,—τοις τε ἐναντιως ϑειω λεγομενοις. St Paul, in writing to the Ephesian converts, formerly the votaries of Diana, addresses them as having lately been ἀϑεοι ἐν τῳ κοσμῳ, atheists in the world, because they had paid their adorations to beings who, in the characters ascribed to them, were devoid of every attribute of divinity,—τοις μη φυσει ουσι ϑεοις. To the same purpose Dr Clarke expresses his opinion, that all who deny the principal attributes of the divine nature are to be numbered among the atheists. In this particular, the language of Mr Hume coincides with that of these Christian writers. All polytheists and idolaters, he remarks, are to be considered as superstitious atheists, because they acknowledged no being who corresponds with our idea of Deity. The fathers of the Christian church branded all the idolatrous Gentiles with this reproachful term; and they, in their turn, retorted the accusation, as Justin Martyr declares in his Apology,—ἀϑεοι κεκλημεϑα, &c. Both parties proceeded on the supposition, that the objects of worship, to whom their adversaries rendered homage, were unworthy of the name of gods: the former abhorring the heathen deities as vanities and dumb idols; and the latter deriding the proselytes of the new faith for setting up ξενα δαιμονια, strange and unheard of demons, because they spoke of Jesus and Anastasis (the resurrection).

Those who, in their moral conduct, give no evidence of their belief in a superior power, or, in other words, who act as if there were no God, are generally denominated practical atheists. In this sense, Sophocles, Plato, and other ancient writers, apply the term to those impious persons who neglect the institutions of divine worship, and contemn the obligations of morality.

It has often been questioned, whether a speculative or contemplative atheist ever existed; and it is generally admitted that the instances have been rare, in which men have so completely divested themselves of the original feelings of the mind, as to take refuge in absolute atheism. Cicero says, that there never was a man who constantly and absolutely denied a God. If this assertion be well founded, there can be no atheists, according to the definition of Shaftesbury and others. All must be exempt from the charge, in whose minds the opinion is not coeval with the very dawn of intelligence, and all who, at the close of life, may have been led, either by some undefined terror, or by the importunity of others, to acknowledge, that their belief was the same with that of other men. Our opinion is, that, in strict propriety of language, the term atheist must comprehend all who are not theists,—all who do not ascribe the formation and government of the world to an intelligent power. In the whole compass of the Pagan history, we find no unequivocal trace of what can, with any degree of correctness, be named polytheism, or the belief in a plurality of uncreated, self-existent beings, the authors and preservers of the world. The opinion of Zoraster and the Magi concerning a good and an evil principle, commonly called the system of the Manichæans, is the nearest approach to a scheme of polytheism. But it appears to be universally admitted, that the Pagan deities were never regarded by their worshippers as the creators or governors of all nature; and indeed Aristotle proves the impossibility of conceiving a number of original self-existent beings. These imaginary divinities were either the animating spirits which impelled the heavenly bodies, or they were the souls of good men and heroes departed, or the invisible tutelary powers which watched over particular regions and individuals, or they were abstract qualities personified, as health, temperance, fame, or last of all, they were merely a diversity of appellations referring to the same object. This last Cudworth calls Polyonomy. The religion of the ancients consisted chiefly (or entirely, as Bryant says,) in Δαιμονολατρεια, the worship of deified mortals, as mediators between heaven and earth; and, we may add, the invocation of the *genii*, the *lares*, or *penates*, who may be considered in the same light. Some of them believed, that these various divinities were all subordinate to One Supreme. This was a modification of theism. A great proportion, however, of the people could not be viewed as theists. Addicted to idolatry, or rather to dæmonolatry, they rendered homage, and addressed their prayers, to beings who had no concern in the creation of the world, and whom they believed to have sprung, like themselves, from the air, or the ocean.

Sentiments like these we find in the most ancient poets of Greece. Thus Homer says, Ωκεανον τε θεων γενεσιν, και μητερα Τηθυν. Hesiod is less distinct; but he ascribes the same origin to gods and men, Ὡς ὁμοθεν γεγαασι θεοι θνητοι τ᾽ ἀνθρωποι. The scholiast explains ὁμοθεν,—᾽εκ του ἀυτου γενους. Aristophanes says, that Love, the offspring of Night and Chaos, generated all the gods, as well as other animals. πρωτερον δ᾽ ουκ ἠν γενος αθανατων, πριν Ερως συνεμιξεν ἁπαντα. Pindar also says, Ἑν ἀνδρων, ἑν θεων γενος. We could quote many other expressions from the poets, which even the ingenuity of Aristotle has failed to reconcile with the principles of theism. Longinus, speaking of the gross ideas of the Deity conveyed by Homer, acknowledges, that they are completely atheistical—παντaπασιν ἀθεα.

We are aware, however, that the same writers appear elsewhere to recognise a sovereign God, as the father of all inferior divinities, and the ruler of nature. But as the expressions of the poets are very unsatisfactory, let us inquire how far the opinions of the philosophers were rational and consistent.

If we recur to the earliest times, we are compelled to acknowledge, that the notions of the wise men, as they were called, were at least as chimerical and false as atheism itself: and in the more enlightened periods, we are mortified to find, that though there were a few who ascribed the formation of worlds to a Supreme Mind, there was not one who honoured him as the original creator of matter itself. The substance of which all things are framed, was supposed, by the theists, to be co-eternal with the prime mover, who bestowed on it form, and life, and activity. In vain do we look for the belief in a Being who gave origin to all dependent existences; and if the creation of matter itself is to be considered as an essential attribute of the divinity, we must admit that it does not seem to have entered into the conceptions of the founders of any of the schools. It is perfectly evident, that Anaxagoras, Plato, and Aristotle, the three greatest luminaries of Athens, held the eternity of matter, and applied the incontrovertible axiom, nothing can proceed from nothing, to prove that to the production of the present system, the pre-existence of a material cause was not less necessary, than the pre-existence of an omnipotent energy or mind.

For an account of the opinions of other Grecian theologists, we would willingly refer to Cicero's treatise *De Natura Deorum;* but we must caution our readers against relying implicitly on his authority. His enumeration is not complete, and his view of the different systems is not only incorrect, but sometimes contradictory. Neither can we vouch for the accuracy of the laborious Cudworth, who, in his attempt to overthrow the different atheistical hypotheses, was anxious to avail himself of every expression in the writings of the ancients which could be interpreted so as to support his peculiar system. Bayle and Lord Bolingbroke have many observations on the subject, but they also had preconceived notions to support.

Till the time of Anaxagoras, the leaders of the Ionic school were atheists in the strictest sense of the word. There is some doubt with regard to Thales, whose language is extremely ambiguous; but the tenets of his immediate followers, Anaximander and Anaximenes, are decidedly hostile to the supposition, that mind was the first principle of things. If there were gods, they were either air itself, or the progeny of air. Diogenes Apolloniates held a similar opinion, which approached very nearly to the system of Spinoza.

We shall only mention the names of Democritus, Leucippus, Diagoras, Protagoras, Epicurus, Theodorus, Strato of Lampsacus, Eumerus, Hippo, and Bion of Borysthenes; all of whom either rejected the belief in God altogether, or insisted that it was unnecessary to have recourse to this supposition in order to account for the formation of things; or at least professed themselves unable to perceive any evidences that a God exists.

At a period equally ancient, Confucius, though he spoke sometimes of the Spirit of Heaven, is generally believed to have propagated an atheistical creed among his followers, insomuch that from his time the literati of China have been considered as a race of atheists. It is alleged by others, that Foë, before his death, revealed to a few disciples his secret doctrine, that inanity and vacuity were the principles of all things; and this incomprehensible dogma having transpired, is said to have given rise to the infidel notions of the philosophers. Couplet the Jesuit endeavours to vindicate Confucius from the charge, and Sir William Jones subscribes to the opinion of that missionary; but we must own, that neither in the writings of Confucius, nor in the religious worship of the people, is there any trace of a belief in a Supreme God, or in any powers much superior to human beings. Sir William Temple is said to have been a follower of Confucius, and to have believed that this world existed in its present form from all eternity.

In modern times, the systems of Spinoza and Hobbes have been the most remarkable. The followers of the former call themselves Pantheists, as they maintain God and the universe to be the same. The most impious among them were Meier a physician, Lucas, also a physician, Count Boulainvilliers, and John Toland.

Among modern atheists we may also mention Barbara, the wife of the Emperor Sigismund, a rare instance, says Bayle, of such an error being maintained by a woman. Averroës, Campanella, the Popes Leo X. and Clement VII., Cæsalpinus, Des Barreaux, and Charron, have also been accused by different writers; but with what degree of justice, we do not pretend to decide. We know well, that the following persons suffered death for their perverted zeal in endeavouring to disseminate atheistical principles. Giordano Bruno, the author of many impious works, was burnt at Rome in 1600.* Vanini was burnt at Toulouse, in 1629, and to the last moment obstinately adhered to the profession of his unbelief. Casimir Leszynski, a Polish knight, was burnt at Warsaw in 1689, and, after the body was consumed, his ashes were collected and shot from the mouth of a cannon. Cosmo Ruggeri, a Florentine, one of the most audacious infidels of any age, died at Paris in 1615, uttering the most horrible impieties. We might have mentioned also, that among the ancients, Protagoras and Diagoras, followers of Democritus, and Theodorus one of the Cyrenaic sect, were accounted martyrs for atheism. The first was banished, the second condemned and obliged to flee from his country, and the last underwent the punishment of death.

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* Huet and others have said, that Des Cartes borrowed many of his sentiments from this man.

It has been common to reduce this variety of professed atheists to a few general classes. In the first volume of *Observationes Select. ad Rem. lit. Spectant.* it is said that there were three degrees of atheism among the ancients. 1. The denial of the existence of God: 2. Denying that the world is the work of the God or Gods who are acknowledged: and, 3. Asserting that God, in creating the world, was moved, not by his own free will, but by the invincible necessity of nature. Under the last head, Aristotle and the Stoics are comprehended.

We may in general terms refer all atheists to two principal divisions, those who accounted for the present system of things on the supposition of chance, and those who ascribed all things to fate. Cudworth subdivides these classes into four; two of whom believed matter to be animated, and the two others inanimate. The first class were the *Hylozoists*, or *Stratonici*, (so named from Strato of Lampsacus,) who believed all the particles of matter to have life essentially, though without sense or knowledge. Hobbes is supposed to have borrowed some of his notions from this school. A second scheme, called the *Pseudo-Zenonian*, or *Stoical*, supposes the universe to be disposed and ordered by one regular and methodical, but senseless plastic nature. Seneca, and the younger Pliny, appear to have adopted this opinion. The third form, denominated the *Hylopathian*, or *Anaximandrian*, resolves every thing into ὕλην, matter, and its παθη, affections, forms, and qualities. This was the unintelligible language of the Ionic philosophers. The last form, the *Democritic* system of atoms, is by far the most considerable, and the best known, chiefly in consequence of its having been adopted by Epicurus, and illustrated by Lucretius in one of the most beautiful productions of the Roman muse,—the poem *De Rerum Natura*. The Anaximandrian and Democritic atheists derive all things from a fortuitous nature, and assert the eternity of matter, but not of the world. The Stratonical and Stoical atheists suppose some life to be fundamental and original, ingenerable and incorruptible; but they do not admit that it possesses consciousness or perception.

All these sects, it will be observed, undertook to solve the phenomena of nature by means of hypotheses, which excluded the operation of mind; but which, it must at once be perceived, were altogether unsusceptible of proof. Modern atheists have in general been more cautious. They have contented themselves with endeavouring to refute the arguments on which the belief in a Deity is founded; and some of them have thought it prudent, like the ancient Pyrrhonists, to entrench themselves in unlimited scepticism. By the aid of metaphysical subtleties, they have sometimes confounded the ignorant, and perplexed even the rational believer. But we are confident, that the wonderful œconomy of the material world, the evident adaptation of means to ends, the mutual subserviency of different parts of nature, the symmetry, the harmony, the manifest unity of design, and the numerous beneficial provisions for the accommodation and enjoyment of sentient beings, which every moment burst on our notice, cannot be contemplated by a sound and reflecting mind, without irresistibly impressing a conviction, incomparably more powerful than any of the transient doubts, resulting from objections which insinuate that all our knowledge is delusive.

If the indications of design be so abundant, and if the idea of Deity be so natural and obvious, whence is it, that a multiplicity of systems have been contrived by speculative men, to account for the creation of the world without the aid of intelligent power? and what have been the causes which have led numbers to embrace these unsatisfactory tenets, or at least to reject the belief in a God? Lord Bacon says, in one part of his writings, that the principal causes of atheism are curious controversies, and profane scoffing. In another place he adds to these, the unworthiness of priests, and what he calls learned times, especially when attended with peace and prosperity. He says also, that atheism proceeds from folly and ignorance; because, though in the threshhold of philosophy, the mind, dwelling on second causes, may be apt to overlook the first cause, yet, by proceeding farther, and marking the dependence and concatenation of the great series of causes, we are brought to believe that the highest link is fixed to the throne of God. These, and similar expressions which occur often in the works of this distinguished man, are singular in one respect: For in his Essays, he seems to doubt if there were ever any contemplative atheists, except perhaps Bias, Diagoras, and Lucian; and yet he is not struck with the inconsistency of assigning causes for a phenomenon, the occurrence of which appeared to be so questionable. He maintains another position, which most people will think paradoxical: He insists, that the atomical school of Democritus and Leucippus, "which is most accused of atheism, doth most demonstrate religion;" because (as is no doubt true) it is inconceivable that an army of minute particles should have produced this orderly and beautiful universe, without a divine marshall to allot them their several stations. He defends Epicurus against the charge of atheism and of dissimulation; and yet, amidst all his incredulity with regard to the existence of atheists, he says, that no heretics are more anxious to gain proselytes than they, and that they will even suffer in the cause, and not recant. We advert to these inconsistences, because we have seen the authority of Bacon quoted in favour of the opinion, that there can scarcely be a contemplative atheist; whereas it is evident that his lordship's opinion was very fluctuating; and we may have occasion to shew hereafter, that some of his other expressions on the subject are still more apt to mislead the inattentive reader.

We are convinced that atheism must, in all cases, proceed from one or more of the following causes: 1. Gross ignorance and inattention. We know that some protest against branding those with the name of atheists, who have no idea of God, and have never thought of any thing like religion, as we are assured by Leri and Richier, missionaries from Geneva, was the condition of some islanders whom they visited, (*Calvin. Epist.* ccxxxvii.) But we do not know what other name to apply to them. 2. Observation of the apparent inequalities in the government of the world, and particularly the experience of calamity resulting from successful villainy, is said to have precipitated some into atheism. *Dum rapiunt mala fata bonos* (says Ovid), *sollicitor nullos esse putare Deos.* The stories concerning Diagoras are well known: The infidelity of a friend, and the fall of his country, are said to have led him to doubt of the superintendence of Providence; and thence he was gradually led to deny the first truths of religion. 3. Extreme depravity of manners, and a perverse determination to admit no considerations into the mind which are unfavourable to profligate and vicious habits, is mentioned by Clarke as a source of the most incurable error; and on this also great stress is laid by Bacon, in his paraphrase on the first verse of the 14th Psalm. 4. The enormous absurdity of the vulgar superstitions disgusted many of the ancient philosophers so much, as to induce them to reject all religion. And there can be little doubt that superstitious misapprehensions concerning the divine character, have driven some into atheism, as preferable to the belief in a being whose attributes inspire horror rather than love. 'Ουκ οἰεται Θεος εἰναι ὁ ἀθεος, ὁ δε δεισιδαιμων ὀυ βουλεται, (*Plut.*) 5. Plato assigns another cause, the affectation of singularity, and a desire of seeming wiser than others. He describes atheism as ἀμαθεια μαλα χαλεπη δοκουσα εἰναι μεγιστη φρονησις. Some may think that this cause can account only for the profession of an atheistical creed; but it must be recollected, that the mind may gradually, and almost insensibly, be led to the belief of the most pernicious errors, by repeated attempts to defend them. 6. Dr Clarke (in his *Evidences of Natural and Revealed Religion*) endeavours to prove, that since the appearance of revelation, every deistical pretence (of which he enumerates four) must of necessity terminate in downright atheism. We have no doubt that scepticism on the one subject has a natural tendency to extend itself to the other; and we agree with Butler, that the chief objections which are brought against the gospel may with equal force be urged against the constitution of nature. 7. The refinements of false science have been a prolific source of errors, and, among others, of atheism. Last of all, we are persuaded, that, in modern times particularly, atheism has proceeded more from the weak and inconclusive arguments which have occasionally been employed to prove the being of God, than from any other cause whatever. The detection of a vulnerable argument is always regarded as a triumph by the atheist; and, therefore, it would be a real service to the cause of religion, if those untenable positions were at once abandoned. We do not wonder at the assertion of Plutarch, that some have been converted from atheism by the sight of apparitions; but surely we must be mortified to find Christian divines, at a later period than the Reformation, gravely asserting, that the existence of devils, as testified by conjurers and necromancers, is a proof that there is a being superior to these malicious spirits, who, if not controuled by a higher power, would speedily sink the whole human race into the most deplorable misery, (*Lud. Viv. de ver. Fid. Christ.* Leigh's *Body of Divinity*, &c.) Cudworth has, with singular indiscretion, employed several pages to prove the reality of spirit, from the phenomena of apparitions, witches, demoniacs, magic and divination. Even Dr Barrow has not scrupled to derive one of the proofs of the being of God from supernatural effects, in the list of which he includes the divination of the Greek oracles, presignifications of events by dreams, the power of enchantments implying the co-operation of invisible powers, intercourse with bad spirits, strange detections of murders, conspiracies and treasons, and many other supposed interpositions from above, which the soundest believers of this age will hesitate to admit, and which every infidel will treat with derision, (*Barrow*, vol. ii. serm. 9.) A similar imprudence on the part of Archbishop Tillotson, in thinking it necessary to prove the beginning of the world from the books of Moses, considered as a historical testimony, and connecting this argument with that for the belief in God, gave occasion to a letter of Lord Bolingbroke, more replete with infidelity than almost any other part of his works.—Nay, what is most extraordinary of all, some pious persons have argued thus: There must be a God, for we have his own testimony in his word; and this, say they, is the strongest possible testimony, (*Atheomastix*, by Fotherby, bishop of Salisbury). We are inclined to think also, that too great weight has been laid on the argument, from *universal consent.* Though no nation has been discovered that professes atheism, we do not see that it is by any means clear, that idolatry is a decisive indication of an original sense of deity, which has been gradually corrupted. It may be true, that idolatry and hero-worship are the traces of more enlightened conceptions; but this opinion cannot be proved, and ought not therefore to be assumed. These superstitions, however, may suggest other important conclusions, which we shall take a future opportunity of stating. Of the five arguments proposed by Aquinas, some Catholic divines have rejected four. Herminier says, that it is a paralogism to attempt to prove that there is a deity by any of the following reasons: That there must be a self-existent being; that there cannot be an infinite succession of causes; that matter cannot begin to move of itself; and that, as different degrees of perfection are observable in different beings, there must be a being infinitely perfect. The only argument which this learned person retains, is that which is derived from the structure and government of the universe. Many orthodox writers have, with the same view, endeavoured to prove that the Cartesian argument is inadmissible. And some scholastics have gone so far as to affirm, that all the arguments furnished by human reason amount only to probability. This is a way of talking which we cannot too severely condemn. Much harm has been done by injudiciously depreciating the powers of human reason to such a degree as to shake all the foundations of natural religion, which are so intimately conjoined with the evidences of revelation, that the subversion of the one must inevitably prove fatal to the other.

Our limits do not permit us here to enumerate and to repel the objections which atheists have urged against the belief in a first cause. We shall content ourselves with remarking, 1. That no atheistical scheme has ever been proposed, which is not attended with insuperable difficulties. 2. That there can be no demonstration against the existence of a first cause. 3. That there are the strongest proofs of the existence of an original cause;—and that every other supposition, either of chance or necessity, involves us in contradictions.—The illustration of these remarks, and the discussion of the different arguments and objections, must be reserved for the articles DEITY, and NATURAL RELIGION.

One or two questions connected with this subject, still remain to be considered. It may be asked, What connection does there subsist between atheism and other speculative errors? The forms of atheism are so numerous, that we may conceive it to be combined with almost every possible modification of false judgements. We may also assert, that in every instance it is associated with other erroneous principles; but there are some with which it is not so necessarily connected as is often supposed. For instance, no atheistic scheme can prove the impossibility of existing after death. It may weaken the proofs of the soul's immortality, but it cannot prove the contrary.

It may also be inquired, What influence the disbelief of a Deity is likely to produce on the conduct of man as a moral agent? It is evident at first sight, that if religion be favourable to virtue, atheism must have an opposite tendency. It is possible, indeed, to have a sense of merit and demerit, and a feeling of self-approbation and disapprobation, antecedent to a fixed belief in a God. This we think will be granted by all at least who consider the internal constitution of the mind, and particularly the power of conscience, as furnishing a proof of a superintending Providence. Without the belief of a God, however, the sanctions of morality are incomplete, and even the standard of right and wrong is undecided. It must at the same time be recollected, that the mere admission that the world was created by a Supreme Power, cannot operate as an incitement to virtue, or as a restraint to the vicious, unless the belief of a Providence be superadded. Nor is it enough that we should consider ourselves responsible to the Sovereign Inspector and Judge of human actions. Our conduct will not be beneficially influenced by the consideration of the Divine Omniscience, and of our dependence, unless we entertain worthy apprehensions of the attributes and laws of God. The supposition of a Deity, whose purposes are not benevolent, whose administration is not just, and who has no delight in rectitude, purity, and mercy, (although we might not consider him, like many of the heathen objects of worship, malignant, capricious, vindictive, and sensual,) cannot in the smallest degree be favourable to virtue, any more than atheism itself.

This remark leads us to examine another point which has often been discussed. Whether is atheism or superstition more subversive of morality, more injurious to private happiness, and more destructive of the peace and good order of society? We answer first, that those moderate degrees of superstition, which do not obliterate the primary sentiments of religion, do not necessarily weaken the obligations of morality. But every variety and gradation of atheism, whether absolute or indirect, has a pernicious tendency. In the next place, it may be observed, that the grosser forms of superstition are either modifications of atheism, or lead directly to atheism; and therefore the effects may be expected to be in the same degree pernicious. Those superstitious persons, who divest the Deity of the attributes of justice and mercy and holiness, worship a being as unreal as fate or chance, and may probably be misled farther from their duty than others who are neither encouraged nor deterred by their belief. What the effects of atheism might be, if invested with power, has never been shewn by experiment. It has often been observed, that an unaccountable degree of bigotry has been exemplified among this deluded class of men; and it is possible that if some of them had been armed with secular authority, their persecutions would have been not less sanguinary than those which have proceeded from the intolerance of fanaticism. The direful consequences of superstition, on the other hand, have often been manifested without disguise, because from its association with many civil establishments, it has claimed the support of law, and perpetrated its atrocities under the colour of justice.

Here we may remark, that Lord Bacon, in treating of atheism, utters a sentiment which has often been applauded. "I had rather believe all the fables in the Legend, the Talmud, and the Koran, than that this universal frame is without a mind." This declaration, we believe, will generally be understood to imply, that a superstitious belief is preferable to atheism. Yet in the next page he says, with greater correctness, that it were better to have no idea of God at all, than one that is unworthy of him; a sentiment borrowed from Plutarch. "Atheism," his lordship adds, "leaves a man to sense, to philosophy, to natural piety, to laws, to reputation, all which might be guides to outward moral virtue; but superstition dismounts all these.—Atheism did never perturb states; for it makes men wary of themselves, as looking no farther, &c." This is reasoning to very little purpose, especially if it be true that only two or three atheists have lived since the world began. But how could his lordship say, that atheism leaves men to sense, to piety, to philosophy, and that superstition robs them of these advantages, and almost in the same breath exclaim, that he would rather swallow all the superstitious stories which have arisen out of the corruptions of religion, than be an atheist; that is, rather be deprived of sense, of philosophy, piety, regard to law and character, than allowed to retain them. We would suggest farther, that the true reason why atheism has not convulsed states, is because this particular heresy is not very contagious, and has never become so epidemical as to muster its armies in the field. Hordes of stupid and irrational savages, have existed, it is said, who had never heard the name of a Deity, or even formed the idea in their minds; and the creeds of many ancient nations present few traces of an enlightened belief. But this deplorable ignorance in which they were immersed, this negative atheism, could never be expected to operate as a principle of action, till it grew up into that monstrous complication of errors which obtains the name of superstition, and which is related in the same degree to atheism as mania is to melancholy.

Bayle has been censured for saying, that there have been atheists and Epicureans, who excelled most of their idolatrous contemporaries in good morals. He vindicates his assertion not only by appealing to the testimony of credible writers, but by accounting for the fact. He shews that other principles, besides regard to the will of God, may restrain men from gross vices,—the love of praise, the fear of infamy, gentleness of natural disposition, and the restraint of human laws. The first which he mentions is unquestionably the strongest. The love of reputation is so powerful, as often to preponderate over every other impulse; and it is generally associated, in minds of a particular construction, with a romantic sense of honour, and a pride of appearing superior to the fear of punishment, or the hope of reward. The love of virtue, for its own sake, is much insisted on by a certain class of writers, as a principle of the highest efficacy; but we cannot ascribe to it any very powerful influence over those who have so far overcome the native feelings of their minds, as to refuse to recognise the signatures of wise and benevolent design, imprinted on every department of nature.

We shall conclude by observing, that atheism has often been punished by the civil power as a crime of the most atrocious malignity. Justice and expediency equally demand, that penal laws relating to religion should be very sparingly enacted. It is certain, that no crime can be more malignant than the attempt to propagate a belief which is so unfavourable to the well-being of human society, the happiness of life, and the hopes of futurity. Yet we cannot subscribe to the opinion, that none write so well against atheists as those who sign the warrant for their execution. It is always dangerous to punish men for sentiments which may be construed by others into a tendency to atheism. Whoever reflects on the condemnation of Anaxagoras, and the martyrdom of Socrates, will tremble at the prospect of having such a power lodged in the hands either of magistrates or churchmen, except when the impiety has been so audacious and unreserved, that there can be no room for hesitating concerning its reality. In such a case as this, when the denial of a God is openly avowed, we believe the most suitable punishment would be to devote the offender, as a dangerous maniac, to solitary confinement. Nothing but insanity of understanding, or still greater insanity of heart, can prompt any man to the atrocity of saying deliberately, there is no God; thus endeavouring to dissolve the firmest ties of morality, to abolish the strongest bonds of social order, and to rob the pious mind of its sweetest solace under the vexations of life, and of the animating prospect into the world to come.

We have purposely omitted taking notice of the objections which have been urged by some late sceptical writers against the argument for a Deity. They will come under our review with greater propriety, when we give an account of the lives and opinions of these authors. We have also passed over a number of particulars which we intended to adduce in support of the opinion we have advanced with regard to the doctrines of the persons whom we have named as atheists. We have even shortened the list considerably, that the article might not swell beyond the bounds we had prescribed to it.

We subjoin a short list of authors, whose writings are calculated to act as an antidote to the poison of atheism.

Galen *de Usu Partium*. Derham *Physico-Theology*. Ray, *Wisdom of God*. Clarke's *Demonstration*. Boyle *of Final Causes*. Bentley and others *Sermons at Boyle's Lectures*. Foster on *Nat. Religion*. Abernethy *on the Attributes*. Paley's *Natural Theology*. (λ)

ATHELING, from the Saxon *æthel*, noble, was the title given by the Saxons to the presumptive heir of the crown. (*j*)

ATHEL or ÆTHELINGAY ISLE, or the ISLE OF NOBLES, a piece of rising ground in Somersetshire, formed into an island by the junction of the Thone with the Parrot, a little below Staunton. It is celebrated as the asylum of King Alfred for nearly twelve months, when the kingdom was overrun by the Danes. From this place, defended by marshes and inaccessible roads, Alfred made frequent sallies upon the Danes, and subsisted himself and his followers by plunder, till better prospects called him from this impregnable retreat. In this island Alfred afterwards founded a monastery of Benedictine monks, and conferred upon it very extensive privileges. Many antiquities were dug up here in 1674. See Hume's *History*, chap. ii. p. 83.; Collinson's *History of Somersetshire*; and ALFRED. (π)

ATHELSTAN, one of the kings of England, and natural son of Edward the Elder, succeeded his father in 925. See Hume's *History*, chap. ii. p. 106.; Henry's *History*, vol. iii. p. 94. vol. iv. p. 225.; and ENGLAND. (*w*)

ATHENÆA, the name of festivals celebrated at Athens in honour of Minerva. See PANATHENÆA. (*j*)

ATHENÆA, a genus of plants of the class Octandria, and order Monogynia. See BOTANY. (*w*)

ATHENÆUM, a place of public resort at Athens dedicated to Minerva, and frequented by the poets, philosophers, and orators, who recited their compositions. The Athenæa were built in the form of an amphitheatre. The most celebrated buildings of this kind were at Athens, Rome, and Lyons. (*j*)

ATHENÆUS, a celebrated Greek grammarian. He was born at Naucratis in Egypt, and flourished, according to the most probable computation, in the beginning of the third century. Very little further is known concerning him. It has been erroneously inferred, from some passages in his writings, that he must have lived to an extreme old age, having been acquainted with the poet Pancrates, and lived after the time of Oppian. Now, though the former received some present from the Emperor Hadrian, who died A. D. 138, and the other dedicated a poem to Caracalla in the year 204, we see no reason for the inference of great age; since Pancrates might have lived 40 or 50 years after Hadrian, and since Oppian, who died of the plague at the age of 30, could not have long survived the date of his *Halieutics*. We can infer no more from these data, than that Athenæus was born towards the end of the second century, and flourished, not under Marcus Aurelius, as Suidas asserts, but in the interval between the reigns of Caracalla and Gordian.

The works of Athenæus have suffered severely in the general wreck of ancient literature. He is supposed to have written, "An Account of the Kings of Syria." Vossius thinks that he also wrote a treatise "concerning the great commanders of armies." The only work of his which has come down to us, is that entitled, "The Deipnosophists," or "The Convivial Men of Learning." This work consisted originally of 15 books; but the two first, the beginning of the third, and several pages of the 11th and 15th, are wanting. These deficiencies, which occur in all the copies of Athenæus, are traced to one common source, the ancient Venetian manuscript, on which alone is supposed to have once depended the existence of the Deipnosophists. Fortunately for the cause of literature, a very old, though inaccurate, abridgment of Athenæus has been preserved, out of which the lacunæ are tolerably well supplied, and even some false readings in the original corrected. This author has been most cruelly mangled by the transcribers and first editors: on his first appearance scarcely a sentence occurred which did not require emendation; and the labour of correcting the poetical quotations, which were long written without regard to the division into lines, appeared absolutely hopeless. Casaubon, and other critical pioneers, have wonderfully succeeded in clearing this thorny field; though, it must be confessed, it is still far from being an agreeable walk for an ordinary Greek scholar.

The plan of this work is somewhat whimsical. Athenæus feigns one Larensius, a learned Roman of opulence and taste, to have entertained at a splendid feast a company of the most distinguished literati, consisting of poets, physicians, lawyers, naturalists, and grammarians; and to these the different dishes and accompaniments serve, in their order, as topics of discussion. In this manner the author contrives to present, *ab ovo usque ad mala*, the opinions of the ancients in almost all their arts and sciences. Thus, the various kinds of fishes, pot-herbs, and poultry, are discussed: in the course of this hodgepodge conversation, historians, poets, and philosophers, are introduced: instruments of music, drinking-glasses and jokes, some of them not the most seemly, pass next in review; not to mention the disquisitions on regal magnificence, naval arts, and an infinity of other subjects. The whole of this strange production is thrown into a dramatic form; by which contrivance Athenæus, who was himself one of the Deipnosophists, is enabled to pass with facility from one dish to another, and to digress with seeming propriety, while replying to the remarks and queries of Timocrates, the other speaker in the dialogue.

Athenæus, considered as a man of talent and taste, occupies but a low station among the ancients. A mere collector of lines and sentences, and a plagiarist who borrowed whole passages from others to express his own meaning, he can be regarded only as a laborious unenlightened compiler: and in this view, there is no doubt, his cotemporaries considered him. But time and accident have conferred on this mechanical writer a degree of importance, which has raised him to a level with the classics. The crude mass of compilation which at one time would scarcely have been noticed, is now, from the destruction of better works, become a precious mine of information. On examining the catalogue of authors and works consulted by Athenæus in his multifarious researches, as it is drawn up by Fabricius, we find some hundred writers quoted, who no longer exist, and near 2000 pieces referred to, of which 800 are dramatic. This wonderful collection of literature was accordingly greedily attacked by the succeeding bookmakers. Ælian frequently copies it in silence: Macrobius, in his *Saturnalia*, adopts at once its plan and its materials; and Suidas Eustathius, Stephanus Niger, and many more, have pillaged and appropriated, with shameless audacity, the rich treasures of Athenæus.

Of this author there have not been many editions. The first was that of Aldus, in folio, printed at Venice, in 1514. Another edition appeared in 1535 at Basle, which, like the former, was accompanied with neither translation nor notes, and was besides exceedingly incorrect. The first edition of any value was that of Casaubon of 1597, which went through several impressions. This edition had the Latin translation of Dalechampius, and the admirable annotations of Casaubon; and still further corrected and enlarged, it again appeared in 1657, 2 tom. 1 vol. Lugd. which is the edition now before us. The Strasburg edition of 1801, by Schweighæuser, we have not yet seen.

There have been several other writers of less note who bore the same name. Athenæus the mathematician, who flourished about A. C. 200, wrote a treatise on machines, which he dedicated to Marcellus the Conqueror of Syracuse, and which still remains. Athenæus Attalensis was a physician, who ascribed the human pulse to the agency of a spirit, or principle of vitality, which he supposed to be a fifth element in nature. He was the chief of the Pneumatic sect, and flourished about the beginning of our æra.

See *Athenæus*, Ed. Lugd. 1657, p. 1. Suid. *Lexic. Tan. Fab.* ch. 43. *Diction. de Bayle.* Fabricii *Bib. Græc.* l. iii. c. 24. l. iv. c. 20. *Edin. Review*, vol. iii. (E)

ATHENAGORAS, an Athenian philosopher, who was converted from paganism to Christianity. He flourished after the middle of the second century, and was held by his cotemporaries in high estimation for his learning, acuteness, and zeal. Having spent his youth at Athens in the company of the sages and rhetoricians of that period, he removed to Alexandria, then a great theatre of learning. Here our philosopher keenly entered into the disputes of the time, and directed the whole torrent of his eloquence and erudition against Christianity. Deeming it necessary to acquire a thorough knowledge of the system which he intended to overthrow, he applied himself with eagerness to the reading of the scriptures. His candour, if we may judge from appearances, was equal to his zeal, and infinitely superior to that of most controversialists either ancient or modern. For on carefully perusing the sacred volume, reflecting on the important and long-desired discoveries which it contains, and weighing impartially the arguments of the primitive fathers against the absurdities of polytheism; this true philosopher became a convert to the reason of his antagonists, and thenceforward became a powerful champion of the cross. He is said to have been the founder of the Alexandrian school, and to have had Clemens Alexandrinus among his disciples.

The church being about this time greatly oppressed in the East, Athenagoras wrote a remonstrance on the subject, addressed to the Emperors Marcus Aurelius Antoninus, and Lucius Aurelius Commodus. This remonstrance, containing the principles of Christianity, and a justification of secession from paganism, was presented, according to the opinion of some writers, by Athenagoras in person, who, it is asserted, had for that purpose been sent at the head of an embassy to the imperial court, about A. D. 168. Others however reject this opinion, on the grounds that such an embassy is not once alluded to in history; that the common title of the piece (πρεσβεια) is in some manuscripts απολογια, or "defence;" and that even πρεσβεια, which may signify "request" as well as "embassy," is never applied to the *instructions* of an ambassador, but to his *mission*. Be this however as it will, the apology or embassy still exists, and is couched in language of considerable elegance. The frequent inversions and parentheses betray, a little too sensibly, the art of the rhetorician: the epithets, too, bestowed on the emperors, are unwarrantably strained, and bordering even on blasphemy; but with all these defects, which indeed belong to the period rather than to the man, the style has undoubted pretensions to the character of Attic; and the train of reasoning, particularly in exposing the pagan superstition, is remarkably forcible and happy. Athenagoras wrote also a book on "The Resurrection of the Dead." In this treatise, which is also preserved, the author properly confines himself chiefly to mere reason, since in a controversy with infidels, an appeal to scripture were evidently fruitless.

The Platonic philosophy influenced, in no small degree, the theological tenets of Athenagoras. He endeavoured to explain, on the principles of that school, the nature of the Deity, the particular energy of the Logos in the divine mind, and the eternal and necessary coexistence of the Father and the Son. He maintained, in opposition to the Peripatetics and others, the entire and absolute distinction between God and matter; and he supposed that these two principles, one spiritual and intelligent, the other imperfect and untractable, were connected by intermediate existences, partaking of the nature of both. These beings he considered as good or evil according as spirit or matter predominated. The evil kind he further subdivided into two classes, of which one consisted of those angels who originally transgressed the divine command; and the other, of the souls of those giants who were produced by the intercourse of the angels with the daughters of men. This philosopher was one of those who recommended and practised celibacy as a piece of meritorious mortification, and viewed second marriages with the utmost abhorrence. Altogether, the writings of Athenagoras savour strongly of that subtlety which distinguished the Grecian schools. He never, it is said, could sink the lofty philosopher into the plain Christian, but retained, even in his dress, the badges of that profession to which he had been educated.

The two remaining treatises of Athenagoras have undergone many impressions, of which the reader will find a long list in Fabricius. The best is that published at Oxford in 1706. The romance, entitled, "True and Perfect Love," has, we know not why, been ascribed to the same Athenagoras. It is for the most part but a compilation of passages from Herodotus, Plutarch, Q. Curtius, Jamblichus, and Heliodorus, and has all the appearance of being the production of some modern Greek. There are ten or twelve more of the same name mentioned by authors; but few of them are of any note.

See Athenag. *Philos. Atheniensis Opera*, passim. *Cave*, H. L. v. i. Fabricii *Bibl. Græc.* vol. v. l. 5. Baronii *Annal. Eccles.* v. ii. *Dict. de Bayle.* Lardner's *Works*, v. ii. Brucker's *Hist. Philos. by Enfield*, v. ii. (E)

ATHENODORUS, an eminent Stoic philosopher, and the intimate friend of Augustus. He was born at a village near Tarsus, in Cilicia, whence he obtained the surname of Cananita. When young, he displayed a remarkable instance of generosity. His brother being convicted of a crime for which his property was confiscated, Athenodorus gave him the half of his; and overlooking the ingratitude with which he received it, continued to treat him with unabated kindness. On going to Rome, the excellence of his character procured for him the friendship of Augustus, that discerning patron of merit; who loaded him with honours, and made him preceptor to Tiberius.

Being indulged by the emperor with an unlimited freedom of expressing his sentiments, he availed himself of this liberty, on one occasion, in rather an extraordinary manner. It happened one day that Athenodorus met a senator of his acquaintance, who was thrown into the greatest alarm, because the emperor had sent for his wife, who was remarkable for her beauty. Nobody, it seems, ever thought of resisting such a mandate; so formidable was the tyrant's resentment. But the philosopher resolved to give him a strong hint; for arming himself with a naked sword, and slipping into the chair instead of the lady, he was thus carried into the presence of Augustus. Athenodorus rushed out of the chair, and furiously brandishing the sword, seemed to be on the point of dispatching him. The emperor was at first greatly terrified; but on learning the intention, he received the admonition with much deference, and behaved, it is said, more prudently for the future.

Having continued at court till he was far advanced in years, Athenodorus obtained permission to return to his native country. Before he went away, he advised Augustus to be on his guard against anger; recommending to him, whenever he felt the commencement of that passion, to repeat the four-and-twenty letters of the alphabet: upon which, the emperor, taking him by the hand, said to him in the kindest

A. C. 1284.

Birth and reign of Theseus.

daughters, Progne and Philomela. Under his reign is placed the arrival and deification of Ceres in Attica. Erectheus, his successor, is generally supposed to have been the son of Pandion, though others represent him as an Egyptian who, having brought a seasonable supply of corn, was, in gratitude, saluted king by the people. He reigned fifty years, and is said to have been the most powerful prince of his time. His reign is celebrated for the barbarous sacrifice of one or more of his daughters, which was demanded by the oracle as the condition of his victory over the Eleusinians. Under the next king, Cecrops II., it appears that Attica had so much increased in population and wealth, that the mode of living in habitations scattered over the country was no longer suited to it. Twelve towns were therefore built in different quarters, in which part of the nation was settled. After the reign of his son Pandion II., which is distinguished by nothing remarkable, Ægeus came to the throne. This prince having gone to the oracle at Delphi, to enquire the cause and remedy of some disasters which were afflicting his people, on his return had an amour with Æthra, daughter to Pittheus, who then reigned at Træzene. Of this connection the fruit was Theseus, a name which ranks next to that of Hercules, among the heroes and demigods of Greece. Ægeus, on his departure, is said to have led his mistress to a sequestrated spot, where, having deposited a hunting sword and a pair of sandals, he covered them beneath a great stone, and desired her, when her child should arrive at such an age as to be able to lift that stone, to send him, with the tokens concealed under it, to Athens. The arrangement took place as appointed; and Theseus, having arrived at Athens, was recognised by his hunting knife, and owned by Ægeus. Either by war or negociation, he then freed Athens from the shameful tribute of seven youths and seven virgins, which had been imposed by Minos king of Crete. On the death of his father, therefore, which took place in consequence of an unfortunate mistake in the signals held out on his return, the Athenians readily saluted him king. Having already distinguished himself as a warrior, he now acquired fame as a legislator. He abolished all the independent authorities established in the twelve districts, into which Cecrops had divided Attica, and which had rendered that country little more than a collection of detached states. In return, he communicated to all, the privileges of Athenian citizens, and concentrated in Athens all the legislative and judicial authority. He instituted the festival called *Panathenea*, as a bond to unite the whole Athenian people. He divided the inhabitants into three classes, nobles, husbandmen, and artificers. To the former was assigned the superintendance of religious ceremonies, the administration of the laws, and the appointment of magistrates. The people received a share in the legislature: he is said to have divested himself of a large portion of the regal power, retaining only the command of the army, and some share in the executive. This sacrifice is commonly celebrated as an unparalleled display of patriotism; but here we must own ourselves somewhat sceptical. That such a step should be altogether voluntary, seems hardly consistent with the general character of human nature. From other circumstances it appears, that the people were becoming daily more jealous of the sovereign authority, and were with difficulty kept in subjection. Theseus, being almost an elective monarch, would be under the necessity of courting them; so that it appears probable, that in enlarging their power, he merely acted with a prudent accommodation to his own situation, and the circumstances of the times.

The rest of the life of Theseus is rather personal to himself, than connected with the history of Athens. Intoxicated with prosperity, he appears, towards the end of it, to have indulged in irregularities, which lost him the confidence of the people, and drove him into exile. His immediate successors, Mnestheus and Demophon, went successively to the Trojan war, and the latter is said to have been one of those inclosed in the wooden horse.

Nothing remarkable occurs till the reign of Codrus. This prince is immortalized by the heroic sacrifice, dictated by superstition, by which he effected the deliverance of Athens from a formidable invasion. This deliverance had, by the Delphic oracle, been attached to the condition, that the Athenian king should die by the hands of the enemy. Codrus, having insinuated himself into the hostile camp, picked a quarrel with a private soldier there, and suffered himself to be slain. The prophecy produced its own accomplishment. The enemy, disheartened and hopeless of success, retreated into their own country. The Athenians, who had long been jealous of the power of their kings, took this opportunity to abolish a title which had become odious. That of Archon was substituted.

The following is a chronological list of Athenian kings, and their reigns, according to Meursius.

	Years.
Ogyges, who reigned	32
Interregnum, which lasted	190
Cecrops, who reigned	56
Cranaus	9
Amphictyon	10
Ericthonius	50
Pandion I.	40
Erectheus	50
Cecrops II.	40
Pandion II.	25
Ægeus	48
Theseus	30
Mnestheus	23
Demophon	33
Oxynthes	12
Aphydas	1
Thymætes	8
Melanthus	37
Codrus	21

It may be observed, that considerable doubts are entertained with regard to the existence of Cecrops II. and Pandion II., and that the actions ascribed to them are by many referred to the first of their name.

After the establishment of the title of archon, for more than 200 years, a singular silence of history takes place. The names only of those who bore it, have been transmitted to us, Medon, Acastus, Arhippus, Thersippus, Phorbas, Megacles, Diognetus, Phereclus, Ariphron, Thespicus, Agamestor, Æschylus, Alcmeon. On the death of this last, the archonship was limited to ten years, and after passing, on this footing, through six hands, a still greater change took place. The office was made annual, and was divided among nine persons, who were to be chosen by the people, but only out of the class of *eupatrids*, or nobles. One was first in dignity, and gave his name to the year. The second, under the title of king, presided over religious rites. The polemarch, at the first institution, had the superintendance of every thing which related to war. The remaining six, called *thesmothetæ*, exercised the judicial power. The government became thus almost a complete aristocracy, with a mixture, as yet small, of democracy. Such a form of government was, however, peculiarly exposed to party spirit, and contentions for power; these accordingly soon began to shew themselves. The Alcmeonids, descendants of the last perpetual archon, commanding, by their birth, a superiority of respect, Cylon, a young man of distinction, indignant at this preference, seized upon the citadel, with a party of his adherents. He was obliged to fly, and his companions, in spite of an oath to the contrary, were condemned and executed; but the impiety of this action brought thenceforth an odium on the opposite party.

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Faction and discord, however, continuing to rage, a desire arose to remedy them by the institution of written laws, and Draco was chosen as the lawgiver. This person, unexperienced in his office, and viewing only the violence and disorder which prevailed, sought to remedy them by a blind and indiscriminate severity. To every offence without distinction, he awarded the punishment of death, declaring, that "small faults seemed to him worthy of death, and for flagrant offences he could find no higher punishment." The atrocity of this code was soon found to render it incapable of execution; Draco lost the public favour, and died in exile.

This attempt having proved ineffectual, public disturbances continued to increase. The people acquired more and more influence in the government, and mingling themselves with the parties among the higher orders, increased the confusion. It was still exasperated by the inequality of property, and the disputes between debtors and creditors, an eternal source of discord in the ancient commonwealths. Under these circumstances, the necessity for a new legislator was felt, and all eyes were turned towards Solon. This person had already distinguished himself in a very singular manner. Salamis had revolted from the Athenians; and the people had been so dissatisfied with several unsuccessful attempts to reduce that island, that they tumultuously assembled, and passed an edict, inflicting the pain of death on any one who should propose farther measures to that effect. The nobility were highly indignant, and the people themselves became ashamed of their proceeding; but no one durst propose to retract it. In these circumstances, Solon determined to counterfeit madness; and rushing into the market-place in a fantastic attire, recited a song, in which he lamented the disgrace of the Athenian name by the loss of Salamis, and urged his countrymen to efface it. The expedient prevailed; an expedition against Salamis was decreed, and Solon, being appointed commander, made himself master of the island by a skilful stratagem.

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In the business of legislation, however, Solon was preceded by Epimenides, a Cretan, who was invited to Athens, where he introduced a variety of religious ceremonies, then ordinary instruments for holding the minds of men in subjection. The good effects of these, however, disappearing with himself, Solon was soon after called upon to make a radical change in the constitution of the state.

A. C. 604.

The foundation of the system which he established was laid in the supreme power, both legislative, executive, and judicial, vested in the assembly of the people. By them all laws were enacted; every public measure was determined; and to them an appeal lay from all courts of justice: they appointed to all commands. After bestowing on them such powers, it was vain to attempt imposing any limitations on their authority. The supreme legislators were always able to break down any barrier which might oppose their inclinations; and as every member of the state was interested in courting their favour, there would be no want of persons to instigate them to such measures.

Solon, however, in laying down the original plan of the constitution, seems anxiously to have studied to provide a balance against that extreme power of the popular assembly, which he granted less perhaps from his own inclination, than from finding them already the predominant order, possessing both the inclination and ability to assert their claim to it. Upon the higher ranks he conferred the exclusive right to fill all offices in the state, and all commands in the army and navy. He divided the citizens into four classes, according to their wealth. The first class consisted of those who had an income of 500 medimni, or measures of corn; these paid a talent into the public treasury. The second was of those who possessed 300 measures; these kept a horse, and served in the cavalry; they were thence called *Hippeis*, or knights. The third, possessing 200 measures, were called *Zeugites*, and served in the heavy armed foot. All under this were only called upon to serve in the light armed foot, a description of force little respected among the Greeks, who sought, on every occasion, to come to close combat. Such of them, however, as chose to afford the expense, might rank with the heavy armed. A very large proportion went on board the fleet, which was chiefly manned by this order, and which became afterwards a most eligible and lucrative service.

All magistracies, and all commands in the army and navy, could be filled only by the three first orders. It does not appear that this exclusion of the lower orders, which, at Rome, formed the grand source of popular discontent, was considered as a serious grievance at Athens. These offices, from the small salary annexed to them, and from the necessity of courting and feasting the people, were extremely expensive, and could not be filled but by persons who possessed a considerable income. The fourth class had, what was of more value to them, an equal vote in the public assembly; in which, from the superiority of their number, they soon bore down all opposition, and became the sovereign people of Athens. They were also entitled to sit on juries, which were very numerous.

The office of archon still subsisted, and was held in high respect, but without any political importance attached to it. A certain qualification, not only of fortune, but of birth, was requisite for the attainment of this office. They were nine in number, chosen by lot. The first, and principal, was called *Eponymos:* He had an extensive judicial authority, to which was added the regulation of the plays and festivals. The second, who was called *Basileus*, or king, had the superintendance of all religious ceremonies. Originally, throughout all Greece, while the office of king subsisted, this formed part of his prerogative; and, in consequence of the dislike to innovation in religious matters, even after the office was abolished, the title was still retained for this particular purpose. The third, the *Polemarch*, had, originally the superintendance of military affairs; but his jurisdiction was afterwards confined to strangers, and the regulation of some festivals. The remaining six were called *Thesmothetæ*: their office was judicial; and they had the charge of drawing up some reports relative to any proposed legislative changes. See ARCHON.

Besides this exclusive admission to offices, Solon employed other means of elevating the aristocracy. Of them the Athenian senate was exclusively composed. This body consisted originally of four hundred; one hundred from each of the four wards into which Athens was divided: but, when the wards were increased to ten, each of them sent fifty, which raised the number of the senate to five hundred. These members were chosen by lot. Before entering on their office, they underwent a strict examination, which extended to every part of their previous life and conduct; and a similar scrutiny took place on their leaving office, respecting the manner in which they had conducted themselves in the exercise of it. No proposal for a new law could be made to the assembly of the people, without having first passed through their hands. They were bound, however, to receive a proposal from any citizen; nor does it appear that, like the Scottish Lords of Articles, they had any power of withholding such as were disagreeable to them. They met once a day, or oftener. Out of the number of four hundred, fifty were chosen, who were called *prytanes*, and performed, ten in the week, by turns, the office of presidents. These ten were called *proedri*, and chose, by lot, an *epistate*, or first president. From these the senate-house was called *prytaneium*. The senate had a considerable superintendance over different branches of administration; but, upon the whole, their political power seems not to have been great, nor do we find their name often mentioned in the course of Athenian history.

When any law had been digested in the senate, a *programma*, or statement of its nature, was posted up in some public situation. On the day of assembly, the *epistate*, or first president, came, accompanied by the rest of the *prytanes*, and read the decree of the senate, on which they were to deliberate. He then called out, "Who above fifty chooses to speak?" When these had done, he cried, "Any one not disqualified by law might speak." The disqualifications were, the having fled from their colours, the being indebted to the public, or being convicted of some flagitious crime. The vote was given by casting beans, and afterwards pebbles, into a vessel. The assembly met four times in thirty-five days. In the first, they deliberated on the general concerns of the state, and elected magistrates; in the second, they received appeals from the different courts of justice; in the third, they gave audience to foreign ambassadors; the fourth was appropriated to the offices of religion. Besides these ordinary assemblies, however, extraordinary ones could be, and were frequently, called by the magistrates, on any pressing emergency.

Another counterpoise to the preponderance of the people was provided by Solon, in the court of Areopagus, whose power had been considerably reduced by Draco, but which the present legislator restored to all its former privileges. This is the most respectable court of justice known in ancient times. It consisted of those archons who had filled their office with the greatest credit, and had stood an examination of peculiar strictness. But their high character seems especially to have arisen from the circumstance of having been the first judicial body, which was independent both of the legislative and executive powers. The members continued during life. They had also an extensive censorial power, and a large share in the management of the treasury. Pericles, with the view of courting the people, abridged very much their power, a change which was by no means advantageous to the constitution. See AREOPAGUS.

Besides regulating the political constitution of Athens, Solon established also a body of laws, which have served as the basis of all subsequent systems of legislation. He mitigated the severity of those of Draco. Like most of the ancient legislators, he entered deep into the concerns of private life. Strict sumptuary regulations were enacted. The ceremonies to be observed, and the dress to be worn, at marriages and funerals, were particularly enumerated. Industry and economy were strictly enforced. No person was allowed to remain in Athens who could not shew the manner in which he obtained his livelihood; the father who had not taught his son a trade, could not claim support from him in his old age; and he who had wasted his patrimony, was declared incapable of rising to any public honours. Ingratitude, opprobrious language, and disobedience to parents, were also subjected to punishment.

One of the most remarkable laws was that which imposed penalties on those who declined taking part in public dissensions. Solon was aware, that such dissensions must occur in a popular state; but, on these occasions, the wisest and best men are often disposed to withdraw into domestic life, and shun the public tumult. The management of the state would thus fall into the hands of the most ignorant and unprincipled. To prevent this evil, it appeared expedient to make a regulation which might draw the former class out of the retirement to which they were naturally inclined, and force them to engage in the management of public affairs.

Having completed his system, Solon adopted a policy which seems to have been general at that time, and was also employed by Lycurgus. He left Athens, to which he did not return for the space of ten years. The experiment, however, was not fortunate; the tranquillity which he had established, seems to have been the fruit rather of his personal influence, than of the authority of his laws. On his departure, factions broke out, with all their former violence. Lycurgus was at the head of the country, or aristocratical party; Megacles, the chief of the Alcmeonids, supported the party of the principal inhabitants of the city, who were for a mixed government; Pisistratus was the leader of the purely democratical party, which consisted of the highlanders, and of the lower orders in the city. He courted popularity by every method with which a large fortune and engaging manners could furnish him. He lavished money ratus. on the necessitous, and conversed familiarly with all. Thus he silently made his advances to the sovereignty. At length, when his plans appeared ripe, he one day made his entry into the market-place, wounded, and flying, as it were, from pursuing enemies. The people being immediately assembled, one of his friends moved, that a guard should be appointed to attend him. With this he contrived to make himself master of the citadel; and it is also said, that, by a stratagem, he deprived the people of the arms which they were ac- 559. customed to wear. He ruled however mildly, observing all the outward forms of liberty, and enforcing the execution of Solon's laws. Solon was his intimate friend, and fully admitted his merits, but opposed, to the utmost, the establishment of his tyranny. This last account, however, though conformable to the general voice of antiquity, is not considered by Mr Mitford as resting on any very solid evidence. It would appear, indeed, that Pisistratus ruled at first more by opinion than by force; for the heads of the two opposite parties, Lycurgus and Megacles, having coalesced against him, he was obliged to leave the city. The victorious factions, however, could not agree among themselves, and Megacles called in the aid of Pisistratus, in order to expel his rival. The manner in which they accomplished their purpose, however singular it may appear to us, was not ill suited to the ideas of the age. A woman of a majestic figure was dressed in the manner of the goddess Minerva; and the report was spread, that this deity was reconducting Pisistratus to Athens. The people, who probably regretted his absence, readily acknowledged the pretended goddess, and restored him to all his former authority.

Pisistratus, in consideration of this service, had promised to marry the daughter of Megacles, which promise he performed; but conceiving himself now independent of that leader, he ceased to court his favour, and treated his wife in so contemptuous a manner, as irritated her brother in the highest degree. Megacles accordingly again connected himself with the exiled party, and was thus enabled to expel Pisistratus a second time. The latter, however, now determined to assert his claims by force. Possessing, it would appear, considerable interest in Greece, he contrived to raise an army, at the head of which he returned, beat his adversaries, and again assumed the government of the state. He used his victory, however, with the utmost moderation: He inflicted no punishment on those who submitted: He still maintained the laws and government on their ancient foundation. So strictly observant was he of the forms of the republic, that, on one occasion, he allowed himself to be tried for his life before the court of Areopagus. He seems to have done much to polish the character of the Athenians, and to introduce that ardent cultivation of the arts and sciences, which afterwards rendered their name so celebrated. He collected the poems of Homer, which before were merely repeated in scattered rhapsodies. He distinguished himself by military exploits, of which, however, no detailed account has been transmitted to us. In short, he appears to have merited the character of Solon, that, had it not been for his ambition, he would have been the best citizen of Athens. From the time of his first assuming the government till his death, thirty-three years had elapsed; but, reckoning from his ultimate and forcible seizure of the sovereignty, he reigned only seventeen.

A. C. 526.

Hippias and Hipparchus.

His sons, Hippias and Hipparchus, succeeded him. It is not ascertained which was the eldest, but it appears that they reigned jointly. They seem to have been persons of singular accomplishments. They inherited all their father's love for the arts and sciences. Hipparchus is particularly celebrated for the excellence of his character. Simonides, Anacreon, and other poets, were his intimate friends, and constantly near his person. But the Athenians were now become weary of servitude, however mild, and were ready to grasp at any opportunity of regaining their independence. Such an opportunity soon occurred. Two friends, Harmodius and Aristogiton, conceived an enmity against Hipparchus, not originating in very honourable motives on either side. They took the opportunity of the approaching festival of the Panathenea to assassinate him, expecting that the people, who were then allowed to appear armed, would espouse their cause. This hope was disappointed: Harmodius was dispatched on the spot, and Aristogiton seized. The action of these two persons seems to have been prompted by private, and not the most honourable motives; yet such was the passion of the Athenians for liberty, that their names have been, as it were, canonized, and transmitted to posterity as the most perfect models of friendship and patriotism.

Aristogiton, on being apprehended, was immediately put to the torture. His conduct on this occasion is remarkable: Instead of betraying his real accomplices, he named the best friends of Hippias. It is said, that, after going over several, and being asked if there were any more, he replied, "I know of yourself only now, that deserves to suffer death."

Hippias, from this moment, became really a tyrant. The dread of sharing the fate of his brother tormented him with continual suspicion. Many of the principal men were put to death, and the Athenians, to whom the tyranny before had begun to be burdensome, beheld it now with the utmost detestation. Meanwhile the Alcmeonids, who, with their leader Megacles, had been expelled at the last usurpation of Pisistratus, were straining every nerve to effect a return into their native country. Being possessed of very considerable wealth, they rebuilt the temple of Delphi, which had been accidentally burnt; and they executed this work in a manner which rendered the edifice more splendid than ever. This was a service generally acceptable to Greece; and they contrived, in another way, to render it still more subservient to their interests. They gained the priestess, who, whenever consulted by the Lacedemonians, ceased not urging them to restore the liberty of Athens. The Lacedemonians, dreading the resentment of the deity, with which they were threatened, and not unwilling, perhaps, to avail themselves of this opportunity of extending their influence, at last determined to obey the oracle. They sent an army by sea into Attica; but Hippias, with the aid of his Thessalian auxiliaries, routed and drove them back to their ships. The Lacedemonians, however, were not discouraged, but determined on extraordinary exertions to wipe off this disgrace. Next year they sent by land a larger army, under their king Cleomenes. The Thessalians were routed, and Hippias constrained to take refuge within the walls of the city. Here, however, he might have successfully resisted, had not his children accidentally fallen into the hands of the enemy. To redeem them, he consented to abdicate the tyranny.

A. C. 508. Athens was then reinstated in the liberty of which she was so ambitious. Faction, the usual consequence, soon followed. Clisthenes, now the leader of the Alcmeonids, was at the head of the one; Isagoras, son of Tirsander, of the other. These two parties were the same which, from this time, divided all the Grecian states; the aristocratical and the popular. To the former Isagoras attached himself, while Clisthenes sought to rise by paying court to the people. The popular party was henceforth destined to rule in Athens; and Clisthenes, through them, soon acquired a decisive superiority. Isagoras, finding himself unequal to contend with his rival, applied for aid to the Lacedemonians. That people, in consequence of having expelled the Pisistratidæ, conceived themselves to have a right to interfere in the internal concerns of Athens: Cleomenes accordingly set out with an army, and sent before him an order to banish Clisthenes out of the republic. The Athenians, not yet aware of their own strength, complied. Cleomenes, however, soon shewed, that this was not the only object he had in view. He advanced to Athens, and conducted himself there in the most arbitrary manner, banishing seven hundred families, and seeking to vest the whole authority in 300 of the partizans of Isagoras. This was too much for the Athenians; they instantly took up arms, drove out Cleomenes and the partizans of Isagoras, constrained them to take refuge in the citadel, and kept them there closely blockaded. Cleomenes now found himself so hard pressed, that he consented to surrender the citadel, and evacuate Attica. Clisthenes was then recalled, and all the power again centered in the people.

Cleomenes, meanwhile, spared no exertion to assemble an army, which might repair his disgrace. To the Spartan troops he united those of the Corinthians, and other allies, and marched with a formidable army towards Attica. At the same time the Bœotians prepared to invade it from a different quarter, seconded by the Chalcidians, a people of Eubœa. The Athenians, at this critical juncture, displayed all that promptitude and energy, of which they afterwards gave so many signal examples. Not having forces to engage so many enemies at once, they marched first with their whole army against the Lacedemonians, leaving, for the time, Attica at the mercy of the Bœotians and Chalcidians. In this first undertaking, they prevailed without the hazard of a battle. The Corinthians, either affected with scruples as to the justice of the cause, or intimidated by the great force opposed to them, broke up, and returned home. Their example was followed by the rest of the allies; even the colleague of Cleomenes opposed the prosecution of the undertaking; so that he found himself under the mortifying necessity of returning home with the Spartan troops.

The Athenians lost no time in improving this success to crush their other enemies. The Chalcidians appear to have been on the point of forming a junction with the Bœotians, and had advanced, with that view, to the other side of the narrow channel of the Euripus, which separates Eubœa from the continent. The Athenian army, however, advanced with such expedition, that before the junction could be effected, they attacked and routed the Bœotians; then immediately crossing the Euripus, engaged, and on the very same day completely defeated the Chalcidians. After this double victory, they returned in triumph to Athens.

About this time, the Athenians were engaged in a long war with the inhabitants of Ægina, not productive of any memorable events, but important as having first turned their attention to the formation of a maritime force. See Ægina

These petty contests, however, were soon lost in another of far greater magnitude, which was destined to raise Athens to the summit of glory. The Ionians were the most flourishing of the Grecian colonies in Asia Minor. Like the others, they had originally enjoyed liberty, but had sunk under the overwhelming might of the Persian empire, and been compelled to acknowledge its supremacy. They bore the yoke, however, with impatience; and being excited by their chiefs, Histiæus and Aristagoras, they took up arms, and engaged in war with Persia. Sensible, however, that they could not alone resist the force of so mighty an empire, they looked for aid to the states of their mother country. They applied first to Lacedemon, then considered as the leading city of Greece; but that cautious government declined interfering in so arduous an undertaking. Their ambassadors then proceeded to Athens, which, since its recent exploits, had taken a prominent station among the powers of Greece. That people, always enterprising, and ready, without weighing consequences, to embark in any promising scheme, agreed to give their assistance, and sent 20 gallies, with troops on board, which were joined by five from Eretria, a town of Eubœa. On their arrival at Miletus, it was proposed to them to engage in an expedition to plunder Sardis, the wealthy capital of Lydia. In this enterprise they embarked with eagerness; the confederates, by a rapid march, found Sardis unprepared, and immediately proceeded to plunder. But while they were busied in this occupation, the Persians rallied, surprised them in their turn, and drove them out of the town. The confederates now made a precipitate retreat to the coast, but even this did not preserve them from Persian vengeance. The army of the great king came up with them at Ephesus, and after an obstinate engagement, totally defeated them. In consequence of this disaster, dissensions arose among the confederates, and the Athenians returned home, abandoning the cause of their unfortunate allies. Such was the issue of their first contest with the Persian arms, which certainly did not prognosticate that splendid success, with which their enterprises were afterwards crowned.

This affair directed the eyes of the Persian monarch towards Greece, both as an object of resentment and of ambition. His first step was to send round heralds to the different states, demanding earth and water, the usual tokens of submission. All, overawed by the power of Persia, complied, excepting Athens and Lacedemon. These two cities, with a barbarous patriotism, threw the ambassadors into wells, and casting earth upon them, declared, that they had now obtained their demand.

Darius, who then reigned in Persia, proceeded now to more formidable measures. Mardonius was first sent with a large army to cross the Hellespont, and attack the northern districts; but a violent storm having dispersed his fleet, he returned without effecting any thing of importance. A new plan was then arranged. An immense fleet and army having been assembled, it was determined to transport them from the shore of the Lesser Asia, and to land them, first in the island of Eubœa; after having subdued which, and signally punished the Eretrians, they might pass over into Attica. Mardonius, who had been at least unfortunate, was superseded, and the command given to Datis and Artaphernes; the one distinguished by long experience in war, the other by his noble birth. They were accompanied by Hippias, the expelled tyrant of Athens, who had hoped, from the sympathy and ambition of the Persian monarch, to obtain what he could not expect from the consent of his fellow citizens, or the interference of the other states. The armament sailed first to Eubœa, took and plundered Eretria, and from thence prepared to pass over into Attica.

C. 490.

The Athenians, while so great a storm was impending, were not inattentive to the means of security. Besides collecting all their own military force, they applied for aid to the other states of Greece, and particularly to the Lacedemonians. That slow and cautious people, either from superstition or timidity, declared that their religion rendered it unlawful for them to dispatch an army before the time of full moon. The other states were still more backward. The Plateans alone, who lay under peculiar obligations to the Athenians, joined them with 1000 men.

iades.

Miltiades was at this time the most eminent man in Athens. He was sprung from one of the most distinguished families in the city. Having conducted a colony to the Chersonese, where he reigned with almost absolute power, he had an opportunity, when Darius led his expedition against the Scythians, of observing the materials and disposition of the Persian armies. The Athenian system of military command seems then to have been singularly cumbersome and inconvenient. Ten generals were appointed, who commanded in rotation, each for a single day; while one of the archons, named the Polemarch, had the supreme decision in all doubtful questions. Miltiades, however, in this crisis of public danger, was raised by his own talents, and the wisdom of his colleagues, to the chief direction of affairs. Some urged the propriety of a protracted, and merely defensive system of warfare, until the torrent should have spent its force, and the strength of Greece had time to be collected. But Miltiades, addressing himself to Callimachus, who was then Polemarch, after representing the transcendent importance of this decision, which would either obliterate the name of Athens, or raise her to the first rank among Grecian states, gave his opinion decidedly in favour of an immediate engagement. The whole Athenian people were now ardent and united in this glorious cause; but a delay might breed divisions, and cause this spirit to evaporate. Room would be left for Persian influence and Persian gold, the fatal effects of which had been recently experienced in the fall of Eretria. Callimachus, satisfied with these arguments, acceded to the advice of Miltiades. Aristides, who was one of the ten generals, gave, on this occasion, the first example of that virtuous disinterestedness which marked his character, by resigning, on his day, the command to Miltiades. This example was followed by the rest. Miltiades, however, with a prudent moderation, declined fighting till his own day arrived. He drew up his army in a manner which enabled him to call forth all its energies, while it rendered unavailing those of the enemy. The strength of the latter consisted in cavalry and bowmen; accustomed to fight at a distance, and to advance and retreat alternately, over the vast plains of Asia. The force of the Grecian armies, on the contrary, consisted almost entirely in their heavy infantry, armed with pikes, and ranged in a deep phalanx. Miltiades, who knew the strength and valour of this body, was satisfied, that when it came to close combat, nothing in the Persian army could resist its charge. To diminish the effect of superior numbers, he chose a spot which was confined on one side by a mountain, and on the other by a morass. He placed his heavy armed foot, in which all his confidence rested, (though, including the Plateans, it amounted only to 10,000 men,) on each of the wings, leaving the centre to be occupied by light armed troops, and even by slaves, a number of whom had been armed on this emergency. These were more numerous, but from their inferiority in discipline, Miltiades fully calculated on their giving way in the first instance. The Persians, on the other hand, ranged their cavalry and light troops in the wings, and placed in the centre the forces of Persia Proper, which alone were fitted to engage in close combat. Miltiades, in order to encumber the movements of the enemy's cavalry, had caused trees to be felled, and laid across the field. The Persian wings, however, advancing as well as these obstacles would permit, poured upon the Greeks a shower of missile weapons of every description. The Athenians, agreeably to the order of Miltiades, did not return a single javelin, but raising a shout,

Battle of Marathon.

pressed forward in the most rapid manner upon the ranks of the enemy. A mode of attack so unusual, excited at first surprise and derision; but these were soon changed into terror, when they felt the charge of this formidable body, which their cavalry in vain attempted to penetrate. Every thing gave way before the weight of the Athenian phalanx, and in a short time both wings of the enemy were routed, and fled in confusion. Miltiades, then, recalling his victorious wings from the pursuit, attacked in flank and rear the Persian centre, which, having defeated the troops opposed to it, was following them precipitately. The most arduous part of the contest now ensued; for this was the body whose firmness had dissipated all the other armies of Asia. Its situation, however, and the superior valour of the Greeks, soon decided the conflict. The Persians, routed, sought refuge in their ships, whither they were pursued by the victorious Greeks. As an instance of the eagerness with which the latter followed, it is related, that one, having laid hold of a boat with his hand, when that was cut off, seized it with his teeth. The Athenians, in this engagement, lost only 200 citizens, with two of their generals, one of whom was Callimachus the polemarch. The Persians left upwards of 6000 on the field of battle, besides losing an immense booty, and several of their ships. They then made an attempt, by doubling the promontory of Sunium, to take Athens by surprise. But Miltiades, by a rapid march, arrived in time to render this attempt fruitless. The Persian commander then sailed back to the coast of Asia.

Such was this battle, for ever memorable by an issue so contrary to all appearances, and so auspicious to the happiness and freedom of mankind. A small city, hardly numbered till now among the states of Greece, had baffled and driven back in confusion the collected might of the ruler of Asia. Athens had now begun her career of glory; and a series of triumphs succeeded, which soon raised her to be the first among the Grecian states.

Misfortunes and death of Miltiades.

The popular favour, however, which attended the general who had led them to victory, was not of long duration. Such a pre-eminence, enjoyed by any one citizen, was thought dangerous to the liberty of all; and Miltiades having, in the Chersonese, possessed the power, and even the title of tyrant, was supposed likely to aim at a similar pre-eminence in Athens. We hear of no behaviour of his own which could give countenance to those rumours; but their circulation gradually predisposed men's minds unfavourably towards him. This soon appeared, when a disaster befel him. Being sent with a fleet to chastise the islands which had submitted to, and assisted the Persians, he performed his commission at first with success, and exacted large sums from them. But on coming to Paros, he was prompted by private resentment against Tisagoras, a leading man in the island, to make so enormous a demand, as determined the inhabitants to resist to the last extremity. He was wounded in the siege; but at the end of 76 days, the place was on the point of falling, when Miltiades, discovering a light on the shore of the opposite continent, hastily mistook it for the approach of a Persian armament, raised the siege, and returned to Athens. An unfortunate man was never welcome there. An accusation was soon preferred against him by Xantippus, the father of Pericles; he was condemned to pay 50 talents; and not being possessed of that sum, was thrown into prison, where he soon after died of his wounds.

Such was the unworthy fate of the most illustrious of Athenian commanders. Yet so fruitful was she then in great men, that scarcely had he disappeared, when two arose, who were well worthy of supplying his place. These were the celebrated rivals Themistocles and Aristides. No greater contrast could be exhibited, than by the character of these two men. The former seems to have possessed every quality which could enable him to take the lead among the multitude. Bold, impetuous, enterprising even to rashness, and at the same time artful, subtle, versatile, he at once possessed a conformity of character which made him the object of their favour, and could practise every art for availing himself of that favour; nor was he restrained by any very scrupulous rules of morality, from using such means as seemed most likely to accomplish his ends. He promoted, however, to the utmost, the greatness of his country, whether out of patriotism, or at least as connected with his own greatness. While he favoured the cause of the people, Aristides, on the other hand, supported that of the aristocracy. This man was in every respect the reverse of Themistocles. Moderate, rigidly and immoveably just, little ambitious of popularity, he rested satisfied with the approbation of his own mind, and stooped to none of those arts by which his rival conciliated the public affection. The party, besides, to which Themistocles had attached himself, was now become decidedly superior. After a severe struggle, therefore, he found means to effect the banishment of his rival, which was decreed by means of the *ostracism*, an institution peculiar to Athens, and of a very remarkable nature. By it, any citizen, without accusation or trial, by the mere votes of the people, (written on a species of shell,) might be banished for ten years. It inflicted no stigma, being generally imposed on the most eminent citizens, from whom it was supposed that most was to be feared. Some have branded it as an absurd and capricious exercise of popular despotism; while others applaud it as a mild and effectual method of preventing that tyranny, which, in a popular state, is apt to ensue from the too commanding character of any one individual. Something between the two may probably be the soundest opinion; for though, in such a constitution as that of Athens, there seems a real ground for the institution, yet there is no doubt that it was often capriciously and unjustly exercised.

Themistocles was now left supreme head of the republic. In this capacity he performed a signal service to his country, and to all Greece. The war with Ægina reviving, made the Athenians continually sensible of their naval deficiency. Impressed with this, Themistocles found means to persuade them, that the money produced by the silver mines, which had hitherto been spent in feasting and entertaining the people, should be employed in constructing a fleet. A hundred gallies were accordingly put upon the stocks; and with such ability were the funds managed, that Athens soon became the first maritime power in

Greece. This became the safety, both of herself and of all the other states, in the mighty storm which was now impending.

Darius, after the disastrous result of his expedition to Greece, was withheld from farther attempts by an insurrection in Egypt, as well as by domestic dissension. About five years after, however, he died, and was succeeded by Xerxes, a rash and ambitious young prince, who, persuaded by his flatterers that nothing was impossible to the master of such an empire, determined to collect all his forces for this arduous enterprise. Darius had been three years occupied in preparations, which Xerxes devoted four to complete. All the ports of the Asiatic colonies, as well as of Egypt and Phœnicia, were employed in the construction of an innumerable multitude of vessels, surpassing in magnitude any that had yet appeared in those seas. Twelve hundred ships of war, and three thousand of burden, were at length completed. All the subjects and vassals of Persia were called upon to furnish their quotas of troops, and an armament was thus collected, to which the world has seen nothing equal, either before or since. Herodotus has given an elaborate enumeration, which makes them amount to upwards of two millions, besides women and eunuchs; which, added to five hundred thousand who manned the fleet, raises the whole number employed to nearly three millions. Wishing to avoid the unfortunate example of Darius, as well as the inconveniences of a long navigation with so many troops on board, he determined to transport his army over the Hellespont. After some difficulty, a bridge of boats was extended from one side to the other, over which the army continued passing for seven days and seven nights without interruption, until the whole arrived on the Thracian territory. Then, separating into three divisions, they advanced, covering the plains of Thrace, Macedonia, and Thessaly. Most of the inhabitants of these countries, overawed by this immense force, joined their standard. After a memorable encounter, they penetrated through the pass of Thermopylæ, and being joined by the Thebans, poured down with their whole force upon Attica and Peloponnesus. The Peloponnesian states, conceiving themselves unequal to cope in the open field with so mighty a force, determined to withdraw within the peninsula, and to fortify the isthmus of Corinth. The consequence of this arrangement was, to leave exposed the territory of Attica. Themistocles then saw, that the land force of that state alone could never cope with the whole power of the Persians, seconded, as it was, by a strong body of Grecian auxiliaries. Instantly, therefore, with equal wisdom and decision, he formed his plan, which was to abandon the city, and embark on board the fleet all the hopes and fortunes of Athens. To persuade the people, however, to the adoption of such a measure, was no easy task. No where, perhaps, was local attachment so strongly rooted as among the Grecian states. It was interwoven with all the feelings of religion, of patriotism, and of parental veneration. To abandon, to a barbarous foe, their city, the temples of their gods, the tombs of their ancestors, appeared absolute profanation. Themistocles, on this occasion, exerted all his address. He represented to his countrymen the necessity and advantage of this measure; but his chief dependence was on a dexterous management of that superstition, which at present formed a powerful obstacle to his scheme. He contrived to get an oracle from Delphi, which advised them to *defend themselves with wooden walls;* which he interpreted to be their ships. He procured from the same quarter a high panegyric on Salamis, where he wished the fleet to station itself. He accompanied the evacuation of the city with a variety of ceremonies, which gave it the appearance of a religious act. The women and children were sent to Troezene, which generously received them, although Argos, to whose territory it belonged, had basely espoused the Persian interest. When the time of departure, however, arrived, the scene which ensued was affecting beyond expression. Besides separating from all those objects and places, which from infancy they had been accustomed to regard with affection, they were obliged to leave behind a number of old citizens, whom they had not time to remove. Some emotions of tenderness were even inspired by those domestic animals, who, by dismal howlings, expressed their affection and regret for their departing masters.

The Athenians take shelter on board their fleet.

A. C. 480.

We have now to look back to the operations of the two fleets. Xerxes, recollecting the disaster which that of Darius had sustained, in doubling the promontory of Mount Athos, determined to cut a canal through the neck of the peninsula, sufficient to allow two gallies to sail abreast. The fleet passing through this canal, followed the army along the coasts of Greece, till it arrived and anchored in the bay of Sepias. No harbour could contain so immense an armament; it was therefore necessary to station itself in the road, which extends from the city of Castanea to the promontory of Sepias. The Grecians meanwhile had stationed theirs at Artemisium, the northern promontory of Eubœa. The Lacedemonians still retained such a pre-eminence among the other states, as procured for their admiral the command of the whole fleet, although of 380 triremes, they sent only ten.

Engagements near Artemisium.

The Athenians, who had already sent 120, and were preparing more, were disposed to murmur; but Themistocles, with consummate prudence, prevailed on them to acquiesce, rather than cause dissension at so critical a period. Most of the Peloponnesian states urged the necessity of an immediate retreat, in order to assume a station, where they might defend their own coasts. This proposal was strenuously opposed by Themistocles, who looked upon it as equally dishonourable and pernicious to Greece. By his arguments, and by threatening that the Athenians would withdraw, and found a colony elsewhere, he prevailed on the allies to relinquish this design. Meanwhile the Persians, unable to find secure anchorage for their immense fleet, had suffered extremely from a violent storm. Before they had recovered from this disaster, the Greeks made a nocturnal attack, took thirty of their vessels, and destroyed as many more. Next day they again attacked them, and cut off the Cilician squadron. The same storm which had shattered the grand Persian fleet, completely destroyed a division of them which had sailed round Eubœa, in order to take the Greeks in the rear. These favourable circumstances animated the hopes of the confederates, and dispelled, in some measure, the terror which had been inspired by the power and numbers of the enemy. When, therefore, on the third day, the Persians advanced and offered battle, it was not declined. The combat was more obstinate and bloody than any of the preceding. At length, however, the Persians retiring, resigned their claim to the honours of victory. The Greeks, however, had suffered so much, that it appeared impossible to fight such another battle. It was at last determined to retire, and station themselves in the Saronic Gulf, between Athens and Salamis.

Xerxes seizes and burns Athens.

Meantime Xerxes, with the flower of his army, advanced in person into Attica, and proceeded to Athens. That city was still occupied by a few, who could not be removed, or who had preferred remaining. These, abandoning the town, endeavoured to defend themselves in the citadel. They were for some time successful; the strength of the situation, and their own superior valour, rendering the attempts of the enemy fruitless. At length, however, a path was discovered, on a side of the edifice, supposed inaccessible, and therefore left unguarded. By this the Persians ascended, and having put all to the sword, set fire to the citadel, as well as to the temple of Minerva, which was its chief ornament. So elated was Xerxes with this easy conquest, that he immediately sent an express to announce it to Artabanus, at Susa.

When the confederate fleet, from their station at Salamis, beheld the disaster of Athens, they were struck with the deepest alarm. Eurybiades, their Spartan admiral, in conformity with the general sentiment, resolved to retire to the isthmus, with the view of covering the coast of Peloponnesus. Themistocles, however, to whom such a step appeared altogether ruinous, and also instigated by an Athenian, called Menesiphilus, went immediately to Eurybiades, and represented, that if the Peloponnesians were once brought to their own coast, no power could prevent them from leaving the fleet, and returning to their homes; that all the hopes of Greece rested in her fleet; that therefore if this measure was adopted, Greece was lost. Eurybiades was little disposed to listen; and, offended with the warmth of Themistocles, lifted up his cane; to which the other replied in the memorable words: "Strike, but hear." Eurybiades heard, and at length agreed to call a council of the fleet. Here Themistocles prudently avoided the argument which he had urged most strongly to Eurybiades, but which was now likely to prove offensive. He represented the advantages of fighting in a narrow sea, where the enemy could not avail themselves of their numbers, and where, therefore, the superior valour of the Greeks, and strength of their vessels, might be expected to prevail. He even threatened, that the Athenians would desert allies who paid so little regard to their interest, and would found a colony in Italy. This last argument proved the most powerful of all, as the Athenian vessels formed the strength of the fleet. The dispute, however, was warm; and even personal sarcasms were thrown out upon Themistocles, to which, however, he replied so skilfully, as made them recoil on his adversaries. It was at length determined to stay. But when shortly after the Persian fleet began to approach, and the sea appeared covered with innumerable vessels, their courage again wavered, and a general disposition prevailed to set sail, without delay, for the isthmus. Themistocles, ever fertile in expedients, adopted on this occasion a most singular one. By means of a Persian captive, whom he had with him, he sent a message to Xerxes, expressing his attachment to that monarch, and informing him of the intended retreat of the Greeks. He advised him, therefore, to send two hundred vessels round the islands of Ægina and Salamis, which, placing themselves in the rear of the confederates, might prevent the meditated escape. To a monarch so confident of his own power, the advice appeared plausible, and it was therefore adopted without hesitation. Next night, therefore, when the Grecians were deliberating on retreat, news arrived that it was no longer practicable; that they were completely surrounded. This intelligence was confirmed by a most respectable authority. Themistocles, forgetting in this emergency his private resentments, had persuaded the Athenians to recal his rival Aristidès; and that distinguished patriot having made his way through the Persian fleet, arrived while the council was yet sitting. The intelligence he brought was confirmed by others; so that the Greeks now saw that they had no alternative but to prepare for immediate battle.

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The Athenians were stationed on the left wing, nearest to the coast of Attica, and were opposed to the Phœnicians, the first naval power under the dominion of Persia. The Peloponnesians, on the right of the Greeks, were opposed to the Ionians, and other Asiatic Greeks, who occupied the left of the Persians. Themistocles judiciously delayed the attack till the hour when a customary breeze sprung up from behind, under favour of which he bore down upon the Persians. Although he was not the nominal commander, yet the universal opinion of his skill made his example the rule to every one. The Grecian fleet amounted to three hundred and eighty vessels, while that of the Persians exceeded twelve hundred. In consequence of the confined situation, however, in which the battle took place, the latter could not bring a much greater number into the action, but were obliged to arrange their vessels in successive lines, one behind the other. The first and severest shock was on the right, between the Athenians and Phœnicians. But besides the glorious motives by which the former were animated, they acted in an orderly manner, and on a regular plan; while their adversaries fought blindly, and without concert. Victory therefore soon declared on their side. On the other wing, where the Asiatic Greeks fought for Xerxes, it was still sooner decided. These nations, remembering their origin and ancient liberty, were little ambitious of imposing on kindred tribes the same servitude under which they themselves groaned. They soon either deserted or fled. The whole of the first line thus discomfited, fell back on those behind, among whom they spread dismay and disorder. There were no means of rallying such a confused multitude; in a short time the whole fleet took to flight, and the victory of the Grecians was complete. A body of select Persian infantry, which had thrown themselves on the rock of Psyttaleia, to cut off such of their enemies as might seek shelter there, were themselves surrounded and cut to pieces.

Thus terminated this battle, so memorable in the annals of Greece and of mankind. Xerxes, from the shore, where he had seated himself, beheld this mighty disaster, which levelled his towering hopes in the dust. Themistocles at first entertained a plan of detaching a squadron to occupy the Hellespont, and prevent the return of the Persians. But Aristides prudently observed, that their object was far less to destroy this armament, than finally to rid Greece of it; and that it was dangerous to reduce such a host to despair. Themistocles then adopting an opposite policy, sent by his former channel an intimation to Xerxes, that such a design was entertained by the Greeks, exhorting him to lose no time in effecting his retreat. Xerxes, in whom the impression of fear was then as predominant as that of false confidence had before been, made no hesitation in taking the advice; and, with the great mass of his army, made a tumultuous retreat to the Hellespont. He left Mardonius, however, with three hundred thousand men; a number which included perhaps all the real strength of that formidable army, freed from its useless incumbrances.

Retreat of Xerxes.

The Athenians had now returned to their city; and Mardonius hoping to gain them over by the dread of a second time losing it, sent Alexander, king of Macedon, to urge them to submit. The Athenians firmly rejected his proposal; but this magnanimity did not meet with its proper return on the part of the Peloponnesians. They again resolved to confine themselves to the defence of their own peninsula, by drawing a wall across the isthmus. The consequence was, that Athens was a second time taken and plundered. The remonstrances of the Athenians, however, and perhaps the dread of their desertion, at length recalled Sparta to more honourable sentiments. She collected her own force and that of her allies, marched it beyond the isthmus, and joined the Athenians. The combined armies, next summer, fought the battle of Platæa, in which, though the Lacedemonians took the leading part, yet the services of Athens were considerable. She engaged those Greeks, a numerous body, who, to the shame of their country, fought on the side of its enemies. The signal services they had rendered to the common cause, secured them the command of the left wing, which had before been uniformly conferred on the Tegeans.

The Athenians distinguished themselves still more in an action which was fought on the same day, near the promontory of Mycale, in Ionia. The wrecks of the Persian fleet having taken refuge on the coasts of Asia Minor, the Greeks followed them. Under these circumstances, the Ionians conceiving this a favourable opportunity for throwing off the Persian yoke, applied to them for aid. They did not decline the invitation, but landed, and joining their forces to those of the Ionians, gave battle to the Persians, who had assembled an army vastly superior. After an obstinate combat, the Persians were completely routed. The Spartans pursued those who fled towards the passes of the mountains, while the Athenians stormed their camp. In consequence of this victory, Ionia was freed, and a large portion of the Asiatic coast rescued from the hands of the enemy.

The Athenians followed up their victory, by besieging Sestos, a large town of Thrace, commanding the straits of the Hellespont, which they took after a long siege.

A. C. 478.

Athens rebuilt, contrary to the wishes of the Spartans.

The first care of the Athenians, after returning to their city, was to rebuild their walls, and to give them additional strength and solidity. This measure was opposed by the Lacedemonians, under pretence of its being contrary to the interest of Greece that there should be strong places beyond the isthmus. Their real motive, however, was suspected to be an aversion to the rising greatness of the Athenians. Themistocles conducted himself here with great art. He got himself appointed ambassador to Sparta; and before setting out, he caused all the citizens, of every age and sex, to apply themselves to the task of building the walls, making use of any materials which were within their reach. Fragments of houses, temples, and other buildings, were accordingly employed, producing a grotesque appearance, which remained to the days of Plutarch. He then set out for Sparta, but on various pretences declined entering on his commission, till he had received intelligence that the work which he had set on foot was nearly completed. He then went boldly to the Lacedemonian senate, declared what had been done, and justified it not only by the natural right of the Athenians to provide for their own defence, but by the advantage of opposing such an obstacle to the progress of the barbarians. The Lacedemonians, sensible of the justice of this argument, and seeing that remonstrance would now avail nothing, were fain to acquiesce.

Themistocles, ever studious of the maritime greatness of Athens, caused a new and more commodious harbour to be built at Piræus, which in process of time was joined to the city by a very thick wall, five miles in length.

The confederate fleets continued to pursue their advantages. They scoured the shores of Asia Minor, and the Ægean, drove out the Persian garrisons, and enriched themselves by plunder. They also, after an obstinate defence, stormed and took Byzantium.

A. C. 476.

The Lacedemonians had hitherto, by common consent, held the chief command, both by land and sea. The recent events, however, had thrown a lustre around Athens, of which no other state could now boast. They had reaped the chief glory both in the battles of Marathon and Salamis; they had suffered most; had always stood forward generously in the common cause; while Sparta had too often observed a cold and selfish policy. These favourable impressions were heightened by the contrast of the consummate justice and good conduct of her commanders, Aristides and Cimon, with the haughtiness and insolence of Pausanias the Spartan king. Moved by these different considerations, the allies unanimously determined to transfer the chief command at sea, now much more important than land, to the Athenians. The Lacedemonians wisely forbore an opposition, which they knew would be vain: and as a common treasury was necessary for the prosecution of a naval war, Aristides, in whom entire confidence was placed, was chosen both to fix the quotas of the different states, and to perform the office of treasurer. The allies did not ultimately find much reason to congratulate themselves on this new arrangement.

The period, of nearly fifty years, which elapsed from the end of the Persian to the commencement of the Peloponnesian war, is the most splendid in the history of Athens. During this period, she held an undisputed pre-eminence among the states of Greece; yet there occur not, in the events by which it was distinguished, any which were peculiarly remarkable by their magnitude or importance. To prevent the confusion of relating a number of detached incidents, we shall divide them into three parts: Her internal affairs; her maritime operations; and her operations by land.

The rivalship of Themistocles and Aristides continued; but though the latter held now a prominent character in the eyes of Greece, Themistocles was still the most powerful at home. The power of the people, which had long been preponderant in Athens, was greatly strengthened by the issue of the Persian war. All offices were now laid open to them. It was only by gaining their favour, that any chief could rise to the head of the republic. All therefore vied with each other in flattering them, and in removing every remaining obstacle to their uncontrouled sway. Themistocles continued to administer public affairs with vigour, attending particularly to the improvement of the navy. In time, however, envy and jealousy, with the rising influence of competitors, particularly of Cimon, sapped the foundations of his authority. This soon appeared, when the Lacedemonians, always his enemies, preferred an accusation against him, as privy to the treason of Pausanias. It appeared indeed that he had known of it, but he strenuously denied having given his concurrence. He was banished, however, by the ostracism; was driven, by the combined power of both states, from city to city; and at length forced to take refuge in Persia, where he died.

Themistocles banished.

A. C. 473.

A. C. 471.

Aristides died about the same time, universally lamented, (See ARISTIDES.) The whole power then came into the hands of Cimon the son of Miltiades, one of the most illustrious and accomplished characters whom Greece ever produced. He seems to have combined the justice of Aristides with the enterprize of Themistocles. He rather inclined to favour the aristocratical party, which always connected itself with Lacedemon, insomuch that he acquired the surname of *Philolacones*. Necessity, however, as well as generosity, prompted him to the most profuse distribution of the wealth which he obtained by his conquests in Thrace and Asia Minor. He kept an open table; he allowed indiscriminate admission to his farms and gardens. In process of time, however, he shared the usual lot of the chiefs of Athens. His aristocratical propensities were not welcome to the people, who were now all powerful; and his regard to national justice, often clashed with that eagerness to grasp at every mode of acquisition, which too much distinguished the foreign policy of Athens. He was accordingly accused for not having, without the least ground, made war on Macedonia, and he was condemned by the ostracism.

Cimon.

Perick

His successor was Pericles. He had supplanted his rival by the sedulous practices of all those arts, by which popular favour may be attained. The measures, however, which he proposed for this purpose, were far from being either laudable or beneficial to Athens. They consisted in removing every remaining check on the power of the people, already too exorbitant. He contracted greatly the jurisdiction of the Areopagus, which had probably given umbrage to the popular assembly. Still, however, they missed the splendid liberality of Cimon, which Pericles was unable to rival. Out of this dilemma, he extricated himself in a manner equally unjustifiable and pernicious. He persuaded the people to employ, in their private accommodation and amusement, not only the public money, but the common treasury of Greece. It must be owned, however, to have been spent, under his direction, with equal taste and magnificence. He adorned the city with splendid works of art; he encouraged learned men; and the drama, under his auspices, rose to a perfection before unattained. His management of the foreign affairs of the republic, was moderate, wise, and vigorous. Cimon, after five years of banishment, was recalled, but died soon after, leaving the field entirely open to his successor.

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While these changes were going on at home, Athens carried on a continued and successful war against Persia, and all those who adhered to her cause. The fine island of Cyprus was first rescued from them; after which Cimon was sent to expel them completely from Thrace, an undertaking which was facilitated by the capture of Byzantium. Eion and Amphipolis, the only towns now remaining to them, were reduced, though the latter made a dreadful resistance; and when all hopes were over, the inhabitants threw themselves, with their wives and children, into the flames, rather than submit.

A.C.

Cimon, having thus cleared Europe of the common enemy, sailed into Asia Minor, where, with the aid of the Grecian inhabitants, he drove them completely out of Caria and Lycia. He was then proceeding to attack Pamphylia, but Artaxerxes, solicitous to preserve his provinces, had fitted out a formidable army and fleet. The former encamped on the banks of the Eurymedon; the latter, of 400 sail, was at the mouth of the river. Cimon immediately sailed with 250 gallies, attacked the Persian fleet, sunk a great part of it, and captured the rest, which had vainly sought shelter in the island of Cyprus. About 20,000 troops were found on board, which suggested to Cimon the following stratagem. He dressed his men in the clothes of these Persians, and hastening to the Eurymedon before the news of his victory had reached the Persian camp, procured admittance into it, attacked the army unexpectedly, totally defeated it, and made the greater part prisoners. These two victories, which were gained on the same day, raised Cimon to the utmost height of glory. An immense booty fell into the hands of the conquerors.

Cim
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Soon after, an arrangement took place, which com-who envied or dreaded the prosperity of Athens. A joint embassy was sent to that city, demanding the liberty of all those Grecian states which she now held in subjection. Other demands were added, which appeared to be still more inadmissible. Pericles advised and procured their rejection. War, however, with so powerful a confederacy, was by no means popular; and the enemies of Pericles laid hold of this opportunity to attack him. Several of his friends were tried and banished; and an accusation was brought forward against himself, for having embezzled the public money. From this charge, however, he cleared himself in such a complete and satisfactory manner, as silenced his accusers, and regained him the popular favour.

A. C. 431. Its commencement.

Meanwhile the Peloponnesian war began by an unsuccessful attempt of the Thebans to surprise Platea. This war possessed characters which distinguished it from almost every other, and which more than doubled the usual calamities of arms. It was as much a civil as a foreign war; for in every city there was a party, and commonly a numerous party, entirely devoted to the enemy. This arose from the difference in form of government between Sparta and Athens; the one inclining strongly to aristocracy, while the other was entirely popular. Each of the two nations, on becoming masters of any city, established in power that party which favoured their own form of government, while the heads of the opposite faction were proscribed or banished. These last again, when a counter revolution took place, had not only their security to provide for, but their vengeance to gratify. Thus boundless scope was given to ambition, party rage, the thirst of revenge; the Grecian character, according to Thucydides, underwent an entire change; all the ties of nature were trampled upon; and Greece exhibited, during thirty years, a perpetual scene of conflict and calamity.

Almost all Greece took part in this quarrel. Most of the continental states sided with Sparta, which was most powerful by land; Argos, however, with its dependencies, stood neuter, while the Acarnanians, who bordered on Corcyra, and Platea, an ancient ally, espoused the Athenian interest. The Athenians again were assisted, rather through fear than affection, by all the maritime states, comprising the islands and the coast of Asia Minor. Chios, Lesbos, and Corcyra, furnished vessels; the rest, money and men.

The Lacedemonians determined, without delay, to avail themselves of their superiority on land, by marching, with their whole forces, into Attica. The Athenians, who had no army which could face them in the field, adopted, by the advice of Pericles, a system of warfare entirely defensive. They withdrew from the country, and leaving it as completely a desert as possible, transported their whole population within the walls of Athens. The confederates arrived, spread themselves over the fields, burnt houses and villages, and attempted, by every insult, to excite the Athenians to leave the city and give them battle. Pericles, however, though with the utmost difficulty, succeeded in retaining them within their walls. Meanwhile he sent a powerful fleet, with troops on board, to ravage the coasts of Peloponnesus. This circumstance, joined to difficulty of subsistence, at length induced the confederate army to withdraw.

Next summer, Attica was exposed to a similar invasion, and the same measures were taken. This year, however, was rendered much more calamitous, by a dreadful plague which broke out in Athens, and swept away multitudes. Among its victims was Pericles, at a time when his services were most wanted.

A new disaster was soon added to those with which Athens was already afflicted. Lesbos, one of the most powerful among its subject-allies, revolted. It had been allowed to retain a greater measure of liberty than the others; but still the yoke was so heavy, that it availed itself of the first opportunity of shaking it off. Buoyed up by promises of aid from the Peloponnesian confederacy, the Lesbians set the power of Athens at defiance. The Athenians, though at first slow to believe this defection, yet when they could no longer doubt its truth, they made every exertion against their new enemy. They fitted out a powerful armament, which they entrusted to Paches, an able officer. Being assisted by the neighbouring islands, and meeting with no very powerful resistance, they were soon able to blockade Mitylene, the capital of that island. The Lacedemonians, meanwhile, were actively employed in equipping a fleet for its relief. Their operations, however, proceeded with characteristic slowness; and when it was at last fitted out, they entrusted the command to a very ill qualified officer. In consequence of his feeble and dilatory measures, the Mityleneans were obliged, before assistance arrived, to surrender, on the hard condition of their lives being spared only till they should have an opportunity of imploring the mercy of Athens. Their confidence in it, however, was by no means well founded; for on the matter being laid before the people, they immediately passed the inhuman decree, by which all the Mityleneans, fit to bear arms, were to be put to death, and the women and children sold to slavery. Happily, however, this stain on the Athenian name was in some measure obliterated. Next day there was a general relenting, of which the Mitylenean deputies availed themselves to procure the calling of another assembly. This shameful decree, though by too small a majority, was then repealed, and the punishment of death inflicted only on a certain number, who were peculiarly guilty.

During this time, the most horrible dissensions were raging in Corcyra, which terminated in a bloody triumph of the party devoted to Athens. The Athenians then conceived the hope, that, by the aid of the Acarnanians, of a party of revolted Messenians, who had taken refuge at Naupactus, and of the neighbouring islands of Cephalenia and Zacynthus, they might succeed in reducing all Ætolia to subjection. They accordingly overran great part of the country, and even stormed the capital Ægitium; but the Ætolians, carrying on a desultory warfare, harassed them to such a degree, that they were obliged to renounce the enterprize, and return, in a very shattered state, to Naupactus. The enemy, however, having in their return ventured to attack, were repulsed and defeated with great loss; which saved the reputation of Demosthenes, who commanded the armament.

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Their attempts to penetrate into the country having thus proved abortive, the Athenians, with their allies, next undertook an expedition to the western coast of Peloponnesus. Passing near Pylus, the Messenians were seized with an ardent desire of again establishing themselves in their native seats. Demosthenes could not, at first, persuade his colleagues to enter into this plan; till, a storm happening to drive them to the very spot, it was in a manner forced upon them. They accordingly began to fortify the place with great activity. The Lacedemonians hastened to assemble their forces, in order to crush, at once, a scheme so alarming. The attack, however, was unsuccessful: their fleet was defeated, and their army repulsed. These disasters were accompanied by another still more serious, which gave a decisive turn to the state of affairs: To forward their operations against Pylus, they had thrown 400 Spartans into Sphacteria, a small island opposite the harbour. After the overthrow of the fleet, this body of men were entirely cut off from the continent. Inconceivable is the dismay which this event excited in Sparta. The Spartans were so few in number, and yet so completely the vital part of the community, that the loss of this small party became a public calamity of the first magnitude. Their pride was humbled; they sent ambassadors to Athens to sue for peace, and even delivered up sixty ships as a pledge of their sincerity. Athens had now an opportunity of terminating the war with equal glory and advantage: but she had no longer a Pericles to guide her councils; they were chiefly governed by Cleon, a worthless haranguer, who raised himself into favour by flattering the worst passions of his countrymen. At his instigation, they made demands so enormous, as convinced the Lacedemonians that they had nothing to hope from negociation. The Athenians even refused, on the most frivolous pretences, to restore the sixty ships, which had been only yielded as a deposit during the negociation.

Meanwhile the reduction of the island did not proceed so rapidly as was expected. It was strong by nature, and the Spartans defended themselves with obstinacy; so that Demosthenes placed his chief confidence in a blockade, which could not be rendered very strict, from the proximity of the opposite shore. Cleon, humouring the natural impatience of a popular assembly, indulged in daily declamation against the generals employed. He concluded by declaring, that, with a little valour, nothing could be more easy than to take it without delay. Upon this Nicias proposed to confer the command upon him. Cleon at first pretended to accept it; but, on finding that the people were really disposed to place him in a situation for which he was conscious of being totally unqualified, he endeavoured to draw back. The people, however, amused at the dilemma into which they imagined him to have fallen, would listen to no apology. Cleon was forced to set out. It so happened, that, by the time of his arrival, Demosthenes had reduced the Spartans on the island to the last extremity, so that in a few days they were obliged to surrender; and Cleon, to the surprise of every one, returned in triumph to Athens.

A. C. 424.

The Athenians now, elated with their good fortune, lost all moderation, and thought only of extending their power in every direction. Nicias took the important island of Cythera, lying at the south-east point of Laconia. Soon after they took Nisæa, the sea-port of Megara, and ravaged the whole coast of Peloponnesus. Fortune, however, soon began to change. A scheme had been formed to invade Bœotia, in concert with the smaller towns of that district, which wished to throw off the dominion of Thebes. The plan, however, was discovered and frustrated; and an Athenian army, advancing to Tanagra, was shamefully defeated. The Bœotians then made themselves masters of Delium.

Revolt of the Thracian allies.

Meanwhile a still severer storm burst forth on the coast of Macedonia and Thrace. The principal towns in the peninsula of Chalcidice, dreading the resentment of Athens, entered into a league with the Lacedemonians, and with Perdiccas, king of Macedon. The former sent, under Brasidas, a force, small indeed, but rendered formidable by the consummate wisdom of its commander. Brasidas passed the straits of Thermopylæ, which the supine security of the Athenians prevented them from making any attempt to guard. He then advanced into Chalcidice, and, though feebly supported by Macedon, contrived, by the united power of valour and eloquence, to possess himself of Acanthus, Stagira, and most of the cities on that peninsula, not reducing them to subjection, but establishing in power the party favourable to Lacedemon. He even gained Amphipolis, a most important town, commanding the navigation of the river Strymon, and the access into the interior of Thrace. The Athenians, who were exulting in all the pride of success, were struck with the deepest dismay by the intelligence of these multiplied disasters. Thucydides, the historian, who had commanded on this station, but with a force wholly inadequate, was recalled and banished; and reinforcements were prepared. The Lacedemonians, however, having prudently taken advantage of this success to solicit an armistice, it was granted, and a negociation entered into. It was soon broken, however, by the clamours of Cleon, who called upon his countrymen to employ his own experienced talents in retrieving the disasters of the republic. He was dispatched accordingly with a respectable force, which enabled him, in the first instance, to take Menda and Torone. Flushed with success, he ventured on a rash attack upon Amphipolis; but here his army was totally defeated, and himself slain. This calamity was only compensated by the death of Brasidas, who fell in the same engagement.

A. C. 421. Treaty with Lacedemon.

The Athenians, having suffered this loss, and having no longer Cleon to urge them into violent measures, listened to the voice of reason, and, under the auspices of Nicias, concluded a treaty of peace with the Lacedemonians. In this treaty it was stipulated, that all the places taken on both sides, in the course of the war, should be mutually restored.

This condition has certainly the appearance of being moderate and reasonable; yet it involved, in fact, an extensive violation of the most solemn engagements. Each party had gained possession of these towns, not as conquerors, but as allies; they had been uniformly welcomed by one party, whose power they had established by crushing the opposite. This party now complained, that, from being the rulers of their country, they were left exposed to all the resentment of the sovereign state from which they had revolted, and, what was more dreadful, to the vengeance of their fellow citizens, whom they had punished or expelled. The cities of the Chalcidice raised loud outcries against Sparta; they refused to yield to a treaty in which they had not been consulted; and general murmurs arose among the allies of both nations. The Corinthians saw in this crisis an opportunity of acting a distinguished part, by espousing the cause of the Chalcidian cities, and of all who thought themselves aggrieved by the treaty in question; and their league was joined by Argos, Mantinea, and Elis.

War in Peloponnesus.

This confederacy seems evidently to have at first been chiefly formed with the view of resisting the pretensions of Athens; yet such was the restless ambition of that republic, that she soon became one of its leading members. So fair an opportunity of humbling the power of Sparta, it was thought, should not be lost. Nicias, the leader of the aristocratical and pacific party, had prevailed for a time, only through the sudden death of Cleon, the leader of the popular party, which was destined to hold perpetual sway in Athens. The place of the latter was soon supplied by a man of far superior talents; by Alcibiades, the greatest orator, the most accomplished gentleman, and the first general, of his age; but whose total want of principle rendered these acquirements, not the safety, but the ruin of himself and of his country. With the view of breaking off the treaty, he is said to have employed an artifice, one of the most shameless that is mentioned in history. Lacedemonian ambassadors arrived, and, being introduced to the senate, shewed full powers to conclude a treaty, not only of peace, but of alliance for the reduction of the mutinous states. Alcibiades, having invited them to his house, after great professions of zeal in their cause, advised them, in order to negociate with greater advantage, to conceal the extent of their powers. Next day, in the assembly of the people, he was the first to demand from them the production of full powers; and when they, in conformity to his private advice, denied that they were possessed of such, he immediately burst into a violent invective, contrasted their present declaration with that of the day before, and, accusing them of falsehood and treachery, procured their immediate dismissal.

War was now kindled in Peloponnesus; but the Athenians acted only the part of auxiliaries. Their favourite object was the extension of their maritime dominion. They reduced Scione, a town of Chalcidice, in the peninsula of Pallene, and avenged, with the most atrocious severity, the revolt of the inhabitants. This cruelty, however, proved rather hurtful to their interests. It roused a spirit of resistance, which, joined to the interference of Perdiccas, rendered it impossible for them to make any farther progress in that quarter. They turned next to an enterprise, the most disgraceful and unjustifiable in which they ever engaged. The island of Melos, one of the finest of the Cyclades, had been peopled by a Lacedemonian colony; yet, notwithstanding its connection with that state, it had, during the whole war, observed the strictest neutrality. The Athenians, however, now sent an armament to take possession of it. They first asked admittance to the assembly of the people: But the Melians, dreading their eloquence, and the contagious character of popular government, chose rather to admit them to an audience of the senate. The conference which took place is preserved by Thucydides, and gives a most curious, but most unfavourable view of the foreign politics of Athens. The only thing like a right which her ambassadors urge, is founded on their having delivered Greece from Persian invasion, whence they infer that they are entitled to command it. Being pressed, however, on this subject, they decline any discussion on the justness of the proceeding, and openly appeal to the law of the strongest. The Melians then endeavour to persuade them, that their own interest would not be promoted by so violent a proceeding. The reply of the Athenians discovers the most unbounded confidence in their own good fortune, and in the power of their state, which nothing, they apprehended, can shake. The Melians, finding entreaties and argument fruitless, prepared to defend themselves by force of arms. Their resistance was long and vigorous; but, the island being at length taken, the Athenians completed their iniquity, by putting to death all the males above the age of fourteen, and selling the rest as slaves.

Reductio of Melos.

A C. 416
The Athenians undertake a expeditio to Sicily.

Such a violent and flagitious system soon hurried them on to their ruin. The island of Sicily had, for some time past, been desolated by violent internal wars. In these the Athenians had repeatedly taken a share; but so unwelcome was their interference, that it had united all the states of the island in a league for the exclusion of strangers. From this none dissented except the city of Egesta, which had incurred the resentment of Syracuse and Selinus; apprehensive of being crushed by whom, the Egestans sought the alliance of Athens. They gave, at the same time, an exaggerated statement of the resources, particularly pecuniary, which they themselves could supply. Nothing could be more imprudent for the Athenians, than to engage, at such a juncture, in a war almost equal in magnitude to the Peloponnesian. They were scarcely at peace with Sparta, which would doubtless avail itself of the first favourable opportunity of humbling them. They had a mighty rebellion to suppress, of their own dependencies, in the Chalcidice. But with the Athenians, always sanguine and adventurous, always aiming at what they did not possess, and thinking of aggrandizement rather than of safety, such considerations had little influence. Masters of Sicily, they would soon become masters of all Greece; nor was there any stretch of greatness to which they might not attain. Alcibiades, with all the young men devoted to him, and, in general, all the leaders of the popular party, strenuously supported a measure, from which the cautious prudence of Nicias in vain attempted to dissuade his countrymen. Even when the latter, hoping at least to procure a delay, gave an exaggerated statement of the preparations which would be necessary, the Athenians voted an immediate supply of all he demanded. Nicias, Alcibiades, and Lamachus, were appointed commanders of the expedition.

The armament consisted of 100 gallies, with a number of transports and smaller vessels, having on board 5000 heavy armed troops, besides archers and slingers. Its rendezvous was at Corcyra, whence it crossed over to the nearest point of Italy, and sailed along the coast till it came to the straits of Messina. Great expectations had been entertained from the Italian states, several of whom were bound by alliance and former favours; but all, jealous of such mighty interference, shut their gates against the Athenians. On their arrival off the coast of Sicily, the Egestans were found altogether incapable of performing their promises. The question then came to be, What was to be done? Nicias proposed to return immediately; Lamachus to proceed without delay to Syracuse, before it had time to prepare, or to recover from its consternation. A middle plan prevailed, which was to sail round the coast, in order to collect resources and allies for the future siege of Syracuse.

race of
biades.

Alcibiades proceeded first to Naxos and Catana, with both which cities he succeeded; but, as he was proceeding to Messana, a deputation arrived, commanding him to return to Athens. His enemies had taken advantage of his absence to press a charge of impiety, founded on the extraordinary circumstance of all the statues of Mercury having been found mutilated on the morning of his departure. It seemed countenanced by the habitual levity of his conduct. Alcibiades, aware of the little lenity exercised by Athens towards her great men, declined standing his trial, and retired to Sparta. It seems difficult to determine, whether his former influence, or his present disgrace, were most fatal to his country. Since the expedition was undertaken, he certainly, of all men, was best qualified to conduct it. The timid and irresolute character of Nicias, on whom the chief command now devolved, rendered him wholly unfit to conduct an enterprize which could succeed only by prompt and decisive measures. He spun out the summer in small and ineffective expeditions against the inferior states. By a skilful stratagem, he drew off the Syracusan army to Catana, and was thus enabled to effect his landing without opposition. An engagement soon after ensued, in which the Syracusans were defeated: But Nicias, not conceiving himself to be yet in a state to finish the siege, immediately reimbarked, and returned to spend the winter at Catana.

of Sy-
e.

Early next spring Nicias, having received large reinforcements, seriously undertook the siege of Syracuse. The inhabitants defended themselves with bravery and resolution; but, as their troops were comparatively undisciplined, and their generals inexperienced, they were gradually pressed closer and closer, and at length reduced to such an extremity, that their fall seemed rapidly approaching.

The Lacedemonians could not observe, without the most extreme jealousy, the progress of the Athenian arms. Alcibiades, whose resentment had now impelled him to espouse their cause, strongly inculcated on them the necessity of vigorously opposing it. By his advice, they were induced to declare war against the Athenians, to send an army into Attica, and to fortify Decelia, which might give them a permanent establishment in the Athenian territory. At the same time they sent Gylippus, an able commander, with a body of select troops, to the aid of the Syracusans. The Corinthians, at the same time, sent a large fleet for the same purpose. Encouraged by the prospect of succour, the Syracusans renewed their efforts. Gylippus landed on the western coast, was joined on his march by the troops of Selinus, Gela, and Himera, and entered Syracuse in considerable force. Two actions followed, in the first of which he was repulsed, but in the second he defeated the Athenians with considerable loss. Animated by this success, the Syracusans, now reinforced by the Corinthian squadron, determined to attack the enemy on their own element. After several failures, they at length succeeded in defeating them there also; an event which filled them with the highest exultation. All Sicily now declared against the declining fortune of Athens; the supplies of provisions were withheld; and the armament gradually mouldered away, while that of the enemy received continual accessions.

In this distress Nicias wrote home, urging strongly the necessity, either of his immediate recal, or of large reinforcements. Never could the latter demand arrive more unseasonably. The Lacedemonians, according to the advice of Alcibiades, had fortified Decelia, and were thus enabled, both to keep Athens in perpetual alarm, and to cut off all supplies of provisions, unless by sea. Yet such was the daring enterprise, and vast resources, of this state, that, instead of recalling Nicias, they fitted out, without delay, an armament nearly equal to that originally sent. The unexpected appearance of so mighty a reinforcement inspired the assailants with new courage, while it struck the besieged with dismay. It was commanded by Demosthenes. By his advice a general attack was resolved on. It was undertaken accordingly by moonlight, against the quarter of Epipolæ; having gained which, they hoped to possess themselves of the whole city. They at first succeeded; Epipolæ was forced; but when the Athenians pressed forward to pursue their advantage, the darkness of the night, and their ignorance of the place, threw them into inextricable confusion. They were unable to distinguish between friends and foes; the enemy gained their watchword; and, after a dreadful combat, they were repulsed with great slaughter.

Demosthenes now advised an immediate return; but this proposal was unexpectedly opposed by Nicias, who dreaded to appear before the enraged assembly of Athens, and entertained hopes, from secret connections which he had formed in the city. Things remained in this state, till Gylippus arrived with a powerful reinforcement, which he had collected from the different states of Sicily. The necessity of departing was now obvious to all; but an eclipse of the sun happening, Nicias, from a principle of superstition, to which he was miserably addicted, conceived it necessary to delay their departure for twenty-seven days. This was a fatal delay to Athens.

The Syracusans, encouraged by their increased numbers, and by the evident irresolution and timidity of their enemies, determined to attack them on their own element. A naval engagement took place, and continued for three days with various success. The valour and skill of the Athenians at first prevailed; but the Syracusans, continually pouring in fresh numbers, at length gained a considerable advantage.

Total defeat of the Athenians.

No choice now remained to the Athenians but of immediate retreat. By the time, however, that they had brought their fleet to the mouth of the harbour, they found that the Syracusans, without losing a moment, had thrown a chain across it. Another battle was therefore necessary before they could escape. On this battle hung the fate of the whole Athenian armament. It was fought long, and with dreadful obstinacy. The armies surrounding the harbour, beheld it as from a theatre, and raised cries of alternate exultation and despair, according to the varying fortunes of the day. Victory at length decided against the Athenians; all their vessels fled, and were driven on shore. Nothing could then exceed their calamity. Their only hope was to escape by land to some of the allied cities; but the route was to be made in the face of a victorious enemy, through a country every where hostile. As in a city taken by storm, they were to fly, having lost their all. They were forced to abandon their dead unburied, a thing never before done by an Athenian army; they were forced even to abandon their wounded, exclaiming in vain to gods and men against this inhuman desertion. The character of Nicias rose in misfortune. By every motive of hope, of interest, of national honour, he endeavoured to rouse his countrymen from despair, and to inspire them with that firmness which alone could save them. Yet, the usual tardiness of his character remaining, he wasted two days in preparation, of which period the Syracusans availed themselves to seize on the passes. The Athenian army, however, for some time forced their way, though slowly, through crowds of surrounding enemies. At length, the rear guard under Demosthenes was separated from the van, and forced to surrender, stipulating only for their lives. The catastrophe of Nicias was still more fatal. Having reached the banks of the river Asinarius, he made a desperate attempt to cross it, conceiving that his retreat would then be secure. The enemy, however, had possessed themselves of its steep banks, and had filled them with armed men. The Athenians, raging with thirst, plunged into the stream, and eagerly drank it, mixed as it was with the blood of their countrymen. The crowds pressing on confusedly, encumbered and crushed each other; their attempts to advance were vain; while showers of darts were incessantly poured down upon them from the surrounding heights. In this dreadful condition, Nicias, seeing all was lost, agreed to surrender on the mere condition of the carnage being stopped. The prisoners were conducted to Syracuse, and were treated with the utmost barbarity. Nicias and Demosthenes were put to death.

Vigour the Ath nians.

We may more easily conceive than describe the consternation of the Athenians, when these fatal tidings arrived; when, instead of their vain and towering hopes of universal conquest, they saw themselves exposed, almost defenceless, to the fury of their enemies. The flower of their warriors had perished; and their subject-allies, whom fear alone had retained in submission, began to manifest symptoms of revolt. In this extremity, the energy of popular government, tempered by misfortune, fully displayed itself. The most able and prudent persons were set at the head of affairs; a new fleet was equipped with incredible dispatch; armaments, sent to Chios, Samos, and Ionia, secured the allegiance of those states; and Athens appeared, to astonished Greece, as formidable almost as she had been in her most prosperous days.

A. C. 41

Change govern- ment.

The characteristic slowness of the Lacedemonians had prevented them from availing themselves of the first consternation of Athens, and seeing her rise so rapidly to her former greatness, they began to be discouraged from the farther prosecution of the war. Alcibiades, however, urged them to proceed, and endeavoured to strengthen them by the alliance of the Persians. Finding, however, that his levity and dissoluteness had ruined his influence at Sparta, he went over entirely to the latter; and finally hoping to regain his footing in Athens, offered to secure for it the Persian alliance, provided an aristocracy were established, and placed under his authority. The Athenians, feeling the urgency of their affairs, and disgusted with the party which had impelled them into such precipitate measures, suffered their consent to be extorted to a change so repugnant to all their former habits. A singular manoeuvre now took place. Pisander, Antiphon, and other old aristocrats, determined, that since this change was to take place, it should be for the benefit of themselves, rather than of one so odious to them as Alcibiades. In his absence, therefore, they procured the consent of the Athenians to adopt a new system of government, in the room of that which they had so long idolized. The popular assembly was reduced to 5000, by excluding the lowest of the people; while the chief power was vested in a council of 400; and, these being all chosen ultimately by five *prytanes*, the whole authority centered in the latter.

Recal of Alcibiad

This government subsisted for some time without opposition. The people, however, soon grew impatient of restraints to which they were so little accustomed; and the new rulers, by abusing their power, aggravated the discontent. In foreign states, too, the aristocratical party, on finding themselves, to their extreme surprise, placed in power by the Athenians, chose rather to trust to the long-tried friendship of Sparta, than to this sudden favour of their inveterate enemies. Several important cities were thus lost to Athens. Meanwhile the army, with Thrasybulus and Thrasyllus at their head, loudly protested against the subversion of Athenian liberty. They recalled Alcibiades, who, with characteristic inconstancy, now embraced the cause of democracy. By his eloquence he charmed all hearts, and soon acquired an absolute ascendant over the troops. He gained over Tissaphernes to the side of Athens; and under his own

Surrender of Athens.

clamorous; and a gloomy and reluctant consent was at length extorted. On the 16th of May, A. C. 404, in the 27th year after the commencement of the Peloponnesian war, the Lacedemonians entered Athens. Even the victors could scarcely refrain from tears, when they beheld this final humiliation of a city, formerly so great in arms, which had once been the deliverer, and had so long reigned the arbitress, of Greece.

Sparta, according to the usual system of Grecian policy, did not reduce Athens to absolute subjection: She merely established in power the party in whose friendship she could confide. Thus the government remained in the hands of Athenians, though the Lacedemonians took the precaution of placing a garrison in the citadel. It was moulded, however, into a system of the most complete oligarchy. The authority was exclusively vested in 30 persons, who, from the violence of their proceedings, and the eternal hatred of Athens to such a government, soon acquired the appellation of the Thirty Tyrants. At the head of them was Theramenes, already mentioned, and Critias, who was still more violent. They were inspired with the usual antipathy of Greeks to the opposite faction, and exasperated by the remembrance of what they had suffered from them. At the same time, the extraordinary strength of the popular spirit in Athens excited continual apprehensions, which could be quieted only by acts of severity. Their first proceedings were directed against the most obnoxious of the opposite party, whose punishment gave satisfaction to the people in general. Emboldened by this success, and urged on by avarice and fear, they proceeded to exercise a general proscription against the innocent and guilty. Every form of justice was by degrees trampled upon; all the citizens, except 3000 devoted adherents, were deprived of their arms; while Theramenes, who attempted too late to stem this torrent of violence, was accused and put to death.

A. C. 403.

Amid every precaution which cruelty could devise, the tyrants still did not feel themselves secure. They dreaded the talents and address of Alcibiades; and Lysander, by his interest at the Persian court, procured him to be put to death. The storm, however, came from a quarter which they least expected. Thrasybulus, who had already distinguished himself as a successful commander, was exiled, with many other citizens of distinction. This person, having collected a few hundreds of other exiles, who had taken refuge at Thebes and its neighbourhood, seized upon Phyla, a small fortress on the confines of Attica and Bœotia. The tyrants were baffled in their first attempt to expel him; this success attracted numbers to his standard; and he soon found himself sufficiently in force to form the bold design of seizing on the Piræus. In this attempt he succeeded: the tyrants, in endeavouring to dislodge him, were defeated with great slaughter, and took shelter in the citadel, while part fled even to Eleusis.

Recovered by Thrasybulus.

The Lacedemonians seem, on this occasion, to have displayed more than their usual tardiness. They did not rouse themselves till some weeks after the expulsion of their adherents from the Piræus. Then, however, Lysander marched with a formidable force, which Athens could not long have resisted, had not divisions arisen among the Spartan chiefs. All parties in Sparta had become jealous of the overgrown power and influence of Lysander; and Pausanias, one of the kings, having been joined with him in the command, thwarted all his measures. Through the influence of this monarch, a negotiation was set on foot, which terminated in the removal of the Lacedemonian garrison, and the complete re-establishment of the independence of Athens. The tyrants vainly endeavoured to defend themselves in Eleusis; they were speedily reduced; several suffered, and the rest were spared by the clemency of Thrasybulus.

A. C. 4

The Athenians were not long of making an ill use of their liberty, by the condemnation and death of Socrates, the best and wisest of their citizens. For the particulars of this event, we must refer to the life of that great man.

Success Conon.

Athens had often astonished Greece by the rapidity with which she rose from her ashes; but never was this elastic power more conspicuous than on the present occasion. Conon, of whom mention has already been made, was the chief artificer of her new greatness. Having formed an alliance with Evagoras of Cyprus, and with the Persian court, he was enabled to collect a formidable navy. With this he attacked the Lacedemonian fleet at Cnidus, under the command of Pisander, totally defeated it, and took 50 gallies. The maritime superiority of Athens was now restored, and the fine settlements on the coast of the Lesser Asia, accessible only by sea, were soon reduced again under her dominion.

A. C. 3

Conon now returned to Athens, and with the aid of Persian treasure, actively employed himself in rebuilding the walls, without which she could never have enjoyed any lasting security. This measure, joined to the successes of the Athenians, struck Sparta with alarm. She now endeavoured to reconcile herself with Persia, against whom she had for some time been waging a successful war. Her intrigues were forwarded by the conduct of Conon, who, as was too common among the Grecian states, preferring patriotism to justice, employed the Persian fleet almost wholly in forwarding Athenian objects. Through the skilful mediation of Antalcidas, Lacedemon concluded that treaty which goes by his name. By it she ignominiously abandoned to Persia the colonies of the Lesser Asia, which had now become, in her eyes, a secondary object. With regard to Greece, she stipulated for the freedom of the smaller cities; but by never executing this article herself, and only insisting on its being executed by others, she made it the means of rendering her authority paramount in Greece. Athens, however, being allowed also to retain her possessions, made no movement.

A. C. 3

Sparta now proceeded under the guidance of Agesilaus, to extend her usurpations over the states of Greece. Mantinea and Thebes, the two most powerful states next to Athens, were subdued, the one by force, the other by stratagem. Thebes, however, under the auspices of Pelopidas, soon re-asserted her independence, and began a career of success, which set bounds to Spartan encroachment. Athens, however, did not interfere, till one Sphodrias, a Spartan officer, secretly instigated by the Theban chiefs, made an attempt to surprise the Piræus. His project was discovered and frustrated; but when the Athenians demanded satisfaction, the influence of Agesilaus screened the offender from punishment. Athens then took up arms, and, while the Thebans were carrying on the war by land, obtained important naval advantages. Under the conduct of their distinguished leaders, Chabrias and Timotheus, they repeatedly defeated the Lacedemonians, ravaged their coasts, and re-established their own influence over the maritime states. After, however, the battle of Leuctra had raised Thebes to the highest pitch of power, and reduced her rival to the utmost distress, the Athenians, jealous of this new influence, began to slacken their efforts, and at length were even induced to interfere in behalf of Lacedemon. An army, sent into Peloponnesus under the command of Iphicrates, compelled the Thebans to retreat into Bœotia. Their promptitude also frustrated an attempt made by Epaminondas to supplant them in the dominion of the sea. A large body of Athenian cavalry was present at the battle of Mantinea, and though the rest of the allied army were defeated, this part was victorious.

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Thebes and Sparta being now worn out by mutual contests, Athens, which had for some time acted only a subordinate part, again rose to be the leading power in Greece. There were many circumstances, however, in her internal constitution, which kept her far beneath the level of her ancient greatness. The democracy had now acquired a complete and uncontrouled ascendency; the preceding convulsions had annihilated all the former checks on its licentiousness. The most worthless demagogues held the chief sway; and the levity, characteristic of a popular assembly, had risen to such a height, that a measure decreed was almost as uncertain as if it had never been proposed. They retained all their former enterprizing and ambitious character, but were no longer disposed to employ the same means of rendering their resolutions effectual. The bearing of arms was now considered as a burdensome duty: "the sovereign people," says Mr Mitford, "more and more dispensed with their own services." Metics (a mixed race between freemen and slaves) and foreign mercenaries, were soon exclusively employed in the army; and though the sea service, formerly the least honourable, was now preferred on account of its opportunities of plunder, yet it gradually fell into the same hands. Such troops, acting without any motive to animate them or secure their fidelity, did no honour to the Athenian name. Athens, indeed, even in her last decline, was still fruitful of great men, but these were resorted to only on pressing emergencies; at all other times, the command was vested in those who could best flatter the passions of the people. In the better times of the republic, the same person had united the characters of orator and general; these were now separated; and every commander had an orator attached to him, who supported his interest in the popular assembly.

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es with
edon.
. 360.

Unfortunately, about this time a power arose, to withstand which would have required the utmost exertions of Athens in her best days. Macedon, remote and barbarous, had hitherto been scarcely numbered among the Grecian nations; but the activity of some of her late sovereigns had improved her civil and military constitution; and in this last respect, she now united all the energy of a barbarous people, with the arts of a civilized one. Philip had recently ascended the throne; a prince of the highest accomplishments, both as a warrior and statesman, ardently ambitious of extending his dominions, and acquiring an influence in the general concerns of Greece. The first subjects of contest were the towns on the Thracian coast, which were equally objects of ambition to the two parties. The Athenians, urged particularly by the hope of recovering Amphipolis, had sent a force in support of Argæus, a pretender to the crown of Macedon. Argæus and his auxiliaries were completely defeated; but Philip, who felt it to be still his interest to court the favour of the Athenians, and who was ambitious of the fame of clemency, not only dismissed his prisoners without ransom, but agreed to withdraw his claims upon Amphipolis, and to allow the Athenians an opportunity of regaining that favourite object of their ambition. Amphipolis endeavoured to protect itself, by joining a grand confederacy of Thracian cities, which had Olynthus for its head. A ground of dissension was thus established between Athens and Olynthus, which proved equally prejudicial to both, whose interest it was to have united against Philip. Athens, however, sent an armament against Amphipolis, under the command of Iphicrates. That general reduced the city to extremity, and brought it to accept of a capitulation; but as the conditions were on the point of being executed, Timotheus arrived with a commission which superseded that of Iphicrates. The inhabitants, who had trusted to the personal character of the commander, rather than to the faith of the Athenian state, refused to place the same confidence in another man; the negociation was broken off; and the Athenian mercenaries having slipt away, the whole enterprize failed.

This good understanding did not long continue between two powers so restless and ambitious. There appears reason to suspect, that the Athenians finding, through the disposition of the people, an opportunity to take possession of Pydna, a Macedonian city, did not scruple to avail themselves of it. Philip, therefore, having freed himself from his enemies on the side of Illyria and Thrace, and seeing no longer any thing very formidable in the military character of the Athenians, formed an alliance with Olynthus against them, and subdued Amphipolis, Pydna, and Potidæa. To cement his alliance with Olynthus, as well as to maintain the character of ostentatious generosity, which he affected, he presented that state with the two last mentioned cities.

Athens was withheld from resisting these advances, not only by her internal feebleness and disunion, but by two other wars in which she was, about this time, involved. The sacred war was then raging in Phocis; an event of which the details will be found in their proper place. The Athenians engaged in it as auxiliaries to the Phocians; but though they seem to have espoused the justest cause, yet they escaped not the suspicion of having been biassed, by receiving a share of the treasure of which the Phocian leader Philomelus had impiously despoiled the temple of Delphi. They rendered, however, an important service to Greece, by barring the pass of Thermopylæ against Philip, who, having already established his influence in Thessaly, had eagerly embraced the imprudent invitation of the Amphictyons to place himself at their head.

A.C. 358.
The Social War.

Another and a more interesting event now excited the attention of Athens. We have already adverted to the oppressive sway which she exercised over her subject allies. This was carried to a much greater height, when the command fell into hands equally weak and profligate. Till now, the Athenians had always, with little distinction of party, placed the most able officers at the head of their armaments. Of these, they still possessed abundance; and Chabrias, Timotheus, and Iphicrates, were well calculated to support the reputation of the Athenian name. To them, however, the populace now preferred Chares, a partizan of some activity and enterprize, but totally unfit for the management of great affairs, and who conciliated the favour of the people, by flattering their passions, and by distributing among them his ill-gotten plunder. Being repeatedly vested with the command of the fleet, his exactions became at length so enormous, that several of the principal dependencies, Rhodes, Chios, Cos, and Byzantium, threw off the yoke, and openly asserted their independence. Hence arose what is called the *Social War*.

This intelligence struck Athens like a thunderbolt. The people were so far roused to activity, that they immediately equipped a powerful fleet, and sent it against Chios. Chares had the chief command, with Chabrias under him. He was repulsed, however, in his attack on the harbour, and Chabrias, who alone entered, refusing to retreat, was slain; an irreparable loss to his country. The confederates, encouraged by this success, attacked the important islands of Samos and Lemnos. The Athenians, recalled to some measure of wisdom, sent a new armament under Timotheus and Iphicrates. These commanders forced the enemy to relinquish their enterprize; but having declined to fight in a disadvantageous situation, were denounced to the people by Chares. Their trial was instituted; and though they escaped the punishment of death, yet such a fine was imposed upon both, as amounted to banishment. The object of the accusation, however, was attained. The sole command of the fleets and armies of the republic devolved upon Chares, by whom they were so completely mismanaged, that no progress whatever was made in the reduction of the revolted states. Chares, too, having for a sum of money assisted Artabazus, satrap of Ionia, against the king of Persia, drew upon Athens the resentment of that monarch. In addition to this, the increasing pressure from Macedon and other quarters at length reduced her to the humiliating necessity of agreeing to a peace, by which she acknowledged the entire independence of the revolted states.

Parties in Athens.

We return now to the affairs of Macedon. Two parties then divided the Athenian councils. One perpetually recommended peace and friendship with that power; while the other breathed only war and hostility. The former consisted partly of the devoted adherents of Philip; and partly also of a description of men, by far the most respectable in Athens, who were abundantly sensible of the danger arising from this quarter. Seeing, however, that the state was now totally unable to contend with the power of that monarchy, the preponderance of which was increased by every new war, they advised a moderate and conciliating system as the only means of preserving to Athens what still remained. Isocrates and Phocion were the heads of this party. In the other, the lead was now taken by Demosthenes. His ardent and glowing mind, conceived the idea of reviving the glory of Athens, and making her all that she had formerly been. While, therefore, he impelled his countrymen to the most daring enterprizes, he at the same time pointed out the means by which these could be brought to a prosperous issue. He urged the necessity of no longer wasting the public treasure on theatrical representations, and of taking up arms themselves, instead of filling their armies with mercenaries. The Athenians, in the decline of their valour, still retained all their ambition, so that he commonly succeeded in his first object, of engaging them in bold and adventurous undertakings; but he in vain endeavoured to make them submit to those privations, which were indispensably necessary for their prosecution. Thus the influence of this party was injurious, both from what it did, and from what it did not accomplish. On the other hand, the party of Phocion, without being able to check the rash schemes of their adversaries, seem only to have embarrassed the execution of them. Thus every thing conspired to the fall of Athenian greatness.

On one occasion, the people discovered some marks of their former activity. Philip had contrived to gain a powerful party in Eubœa, which, availing itself of the small number of Athenian troops kept there, succeeded in gaining an ascendency, and thus threatened to deprive Athens of that important island. This danger was too imminent to be neglected. An armament was immediately equipped and committed to Phocion, now the only great commander remaining to Athens. Phocion, acting with his usual skill and judgment, was not long of defeating the Macedonians and Eubœan malcontents, and of compelling the former to evacuate the island.

Philip duces thus.

The alliance between the Olynthians and Philip was not likely to last long. The possession of the Thracian coast was a primary object of ambition to that monarch; and when he had disengaged himself from other objects, the restless character of this state, full of Athenian partizans, soon afforded him a pretence. The interest of Athens could not be mistaken. A strict alliance was immediately concluded between the two republics, and the Athenians, in compliance with the urgent intreaties of Demosthenes, seriously resolved on a prosecution of the war. As they were in vain entreated, however, to retrench in their expensive amusements, or to submit to the hardships of personal service, every thing went on slowly and languidly. A few mercenary troops were hired, and put under the command of Chares. That general, however, instead of aiding the Olynthians, employed himself in his usual occupation of ravaging the coasts, and plundering the allies; and, having enabled himself, on his return, to give a splendid feast to the people, was hailed with acclamation. New ambassadors, however, soon came from Olynthus, to remonstrate on the inefficacy of this expedition. Another was then fitted out, and a small body of mercenaries at last thrown into Olynthus. This, however, proved but a feeble barrier to the progress of Philip. Having successively reduced city after city, he was now pressing the siege of the capital, which, after a long and obstinate resistance, was reduced to the last extremity. The Athenians, on learning this distress of their ally, began at last to set a formidable expedition on foot; but just as it was on the point of sailing, intelligence arrived, that its object was no more, and that Philip was now master of Olynthus.

Philip having obtained this extent of sea coast, was not long in equipping a formidable navy, which enabled him to make the Athenians feel the hardships of war, even in their own country. He ravaged the coasts of Attica; he landed a body of troops in Eubœa, which, joined to the party that still adhered to him among the inhabitants, enabled him to regain the ascendency in that island. The spirit of the Athenians was broken by such a succession of calamities; and Philip having, in conformity to his usual system, been the first to make pacific advances, all parties seem to have agreed in the propriety of sending an embassy to him. Among the ambassadors were Demosthenes and Æschines, both hostile to that monarch. Demosthenes, in this new character, did not maintain his former reputation, while all admired the politeness and eloquence of Philip. Through the arts of that monarch, aided by the volatility of the Athenian people, the negociation was protracted; successive embassies were sent; while Philip, availing himself of these delays, was crushing Kersableptes, the ally of Athens, and maturing his designs against the liberties of Greece. At length, having gained a body of mercenaries, who defended Nicæa, he obtained possession of that important fortress, and through it of the pass of Thermopylæ. He then lost no time in entering Greece, where, supported by the Thebans, Thessalians, and Locrians, he soon crushed the Phocians, and gave them a prey to the unrelenting vengeance of their enemies, which, however, he interfered to mitigate. He then procured his appointment as general of the Amphictyons, which afforded him a pious pretence for interposing whenever he thought fit, in the affairs of Greece. In this new character, he left a garrison in the citadel of Thebes; and supporting his affected character of moderation, withdrew his army, for the present, out of Greece.

The Athenians were struck with mortal alarm, when they received intelligence, that Philip was establishing himself in the heart of the Grecian states. Demosthenes, who had long warned them of this issue, now acquired additional influence. This advantage, joined to the growing fame of his eloquence, enabled him for some time to exert an almost undivided sway over their councils, and to communicate to them an expiring energy, to which they had long been strangers. Yet it was conceived necessary, under present circumstances, to admit Philip's title of general of the Amphictyons, and not, by denying it, to provoke an immediate war. They held themselves, however, in a state of preparation to resist any farther encroachments.

Athens.

The first object to which Demosthenes directed the attention of the Athenians, was Eubœa. The Macedonian party had already lost considerable ground in that island by their violence and oppression. When Phocion, therefore, was sent with an armament, accompanied by Demosthenes, the eloquence of the one, and the military skill of the other, soon brought back the island to the dominion of Athens.

A. C. 339.

Philip was soon after foiled in a still more sensible point. He had long cast an eager eye on Byzantium, Perinthus, and Selymbria, cities great and opulent in themselves, and important from their command of the Thracian Bosphorus, the key of the Euxine. Thinking this a favourable opportunity, he had commenced operations against them, but met with a vigorous resistance. Demosthenes urged the Athenians to a vigorous support of these cities; armaments were accordingly fitted out; and though the first was rendered fruitless by the ill-conduct of Chares, yet the second, being entrusted to Phocion, was effectual in relieving the Thracian cities, and in forcing Philip to relinquish his designs in that quarter.

Progress of Philip in Greece.

Philip, finding himself thwarted in this point, directed his attention to another, which appeared more promising. His emissaries in Greece succeeded in kindling a new sacred war against the Amphissans, a people of Phocis, and in procuring an invitation for Philip, as general of the Amphictyons, to take the chief command. Philip eagerly grasped at the offer; escaped, by a stratagem, the Athenian fleet, and landed a strong body of troops on the coast of Locris. The Athenians were excited by Demosthenes to send an army of ten thousand mercenaries to the assistance of Amphissa. This force, however, proved too feeble to resist the powerful army of Philip; Amphissa was subdued, and suffered a severe punishment for its alleged impiety.

A. C. 338.

All the cities of Greece, Thebes itself not excepted, were struck with the deepest alarm at this rapid progress of Philip. The Athenians, obedient to the call of Demosthenes, summoned all their strength, and marched it to the frontiers. The orator himself went from city to city, rousing every where the hatred of the people against the Macedonian power. An extensive confederacy was formed, consisting, besides Athens, of Megara, Corinth, Achaia, Leucas, Corcyra, and Eubœa; while Thebes itself evidently wavered. Alarmed by this formidable combination, Philip seized Elatea, an important post, which at once secured his communication with Thessaly, and opened an entrance into Bœotia. This step at once roused Athens to action, and fixed the wavering councils of Thebes. The latter city took now a decided part in the confederacy against Macedon. Demosthenes acquired the same ascendant in its councils as in those of Athens; the armies of the two states united, and prepared to commence operations against the common enemy.

League formed against him.

It is impossible to deny to Demosthenes the praise of activity and vigour in bringing affairs to this crisis. He was now, however, guilty of errors, which frustrated the effect of his former exertions. With the most shameful devotion to party-spirit, he overlooked Phocion, the only great commander whom Athens still retained, and appointed in his stead Chares, whose incapacity had been so often conspicuous. To him was joined Lysicles, a personage never before heard of. A capital error seems also to have been committed in the plan of the war. Against Philip, placed as he was in a mountainous territory, and at a distance from his resources, protracted and harassing hostilities might probably have been successful; but the Grecian levies, little accustomed to war, were ill calculated for coping in the field with his hardy veterans. These considerations were overlooked; when Philip advanced and offered battle, it was not declined; and the two parties, each with about thirty or forty thousand men, prepared to decide the fate of Greece on the plain of Cheronea.

Battle of Cheronea.

The contest was severe. The Thebans were placed on the right wing, the Athenians on the left. The latter, though opposed by Philip in person, were for some time victorious; but, pursuing too hotly, exposed themselves to an attack of the Macedonian phalanx, which soon changed their victory into a defeat. The Thebans also, after an obstinate resistance, were routed, and their sacred band entirely cut to pieces. Philip obtained a complete triumph; while Greece, and above all, Athens, received that mortal blow, from which they never recovered.

It was generally expected, that Philip would avail himself of this opportunity of crushing entirely this inveterate enemy. That prudent prince, however, foresaw, that powerful obstacles were yet to be encountered, and that there was still a spirit in the Athenian people which might render it difficult to hold them in complete subjection. It would appear also, as if the genius and fame of Athens had, in this hour of her calamity, thrown a shield over her. Philip is reported to have said, "Have I done so much for glory, and shall I destroy the theatre of that glory?" Certain it is, that he shewed an anxiety to gain Athens only by conciliation. He dismissed the prisoners without ransom, gave them even their baggage on being asked, and proposed terms of accommodation, which were not only moderate, but advantageous. The Athenians at first spurned the idea of existing by the clemency of Philip, and prepared rather for every extremity of resistance. This display of spirit only served to make Philip adhere the more steadily to his first offers; moderate advices prevailed; and a treaty was at length concluded, by which they retained the whole Attic territory, with the addition of Oropus, a Bœotian city. Lysicles was put to death; but whether deservedly, or as a victim to public resentment, does not distinctly appear.

Such was the final termination of the power and greatness of Athens. From this moment her political existence ceased. Here, therefore, it may be proper to pause, and before tracing the more obscure thread of her subsequent fortunes, take a short survey of what she was during that splendid period, when liberty raised her to the summit of glory, in arts and in arms. We shall begin with a view of her external aspect; we shall then survey her political and moral constitution; and, lastly, consider her wonderful proficiency in the arts and sciences.

Sit an na an At

Athens was situated on the Saronic gulf, opposite to the eastern coast of Peloponnesus. It was inclosed in a sort of peninsula, formed by the confluence of the Cephisus and the Ilissus. From the sea, on which its greatness and importance so essentially depended, it was distant about four miles. It was connected, however, by walls of great strength and extent, with the three harbours of Piræus, Munychia, and Phalerus. The former, though the last of being erected, was soon found the most commodious and important of the three, and became a sort of emporium of Grecian commerce. A bay, formed by projecting rocks, furnished a species of triple harbour, at once spacious and secure; and the surrounding shore was covered with edifices, the splendour of which soon rivalled those of Athens itself. These harbours were joined to the city by a double range of walls, called the *long walls*, of which the north side, extending to Piræus, was five miles; the south, which branched off to Phalerus, was four miles and a quarter in length. That encompassing the Piræus with Munychia, was seven miles and a half. The long walls were built of hewn stone, and were so broad, that carriages could cross each other upon them.

In the centre of the city itself, and constituting its chief ornament, stood the *Acropolis*, the glory of Grecian art. On this elevation the whole of Athens was originally built; but as the city extended, the Acropolis came to serve merely the purpose of a citadel. Here, as in the safest and most conspicuous situation, were accumulated all those works of ornament, of which Athens was so prolific. The Acropolis became the grand depositary for every thing most splendid which human genius could produce, in painting, sculpture, and architecture. Its chief ornament was the *Parthenon*, or virgin temple of Minerva. This splendid edifice was 217 feet in length, and 98 in breadth. Destroyed by the Persians, it was rebuilt by Pericles, with great additional splendour. Within was the statue of Minerva by Phidias, the masterpiece of the art of statuary. It was of ivory, thirty-nine feet in height, and entirely covered with pure gold, to the value of forty-four talents, or £120,000 sterling. The *Propylea* also, of white marble, formed magnificent entrances to the Parthenon. This edifice was on the north side of the Acropolis, and near it was the Erectheum, also of white marble, consisting of two temples, one of Minerva Polias, another of Neptune, besides a remarkable edifice called the Pandroseum. In front of the Acropolis, and at each end, were the two theatres, called the theatre of Bacchus, and the *Odeum*; the one designed for dramatic representations, and the other for music. Both, and particularly the last, were of extraordinary magnificence.

Although, however, the principal treasures of Athenian art were accumulated in the Acropolis, the city itself contained many noble structures. Among these we may particularly mention the *Pœcile*, or gallery of historical engravings; the Tower of the Winds, by Andronicus Cyrrhestes; and numerous monuments of illustrious men. Two of its most splendid ornaments, however, were without the walls: These were the temples of Theseus and of Jupiter Olympius, situated, the one on the north, and the other on the south side of the city. The former was Doric, bearing a considerable resemblance to the Parthenon, and having the atchievements of this hero carved on the metopes. The temple of Jupiter Olympius was Corinthian, and surpassed, if possible, every other structure of which Athens could boast. Immense sums were spent upon it by the Athenians; additions were made to it by successive sovereigns; and at length the fabric was completed by Hadrian. The exterior contained about 120 columns, fluted, sixty feet in height, and six in diameter. The inclosure was half a mile in circumference.

Besides these wondrous productions of art, Athens presented other scenes, sacred in the eyes of posterity by the classical associations which they awaken. The ancient philosophers did not, as has been usual with modern men of letters, immure themselves in the smoky atmosphere of cities. They sought retirement, and the scenes of nature; nor did the zeal of their disciples scruple to follow them. The Academy, where Plato taught, was about three-quarters of a mile to the north of the town: From being a marshy and unwholsome spot, it was gradually improved, planted with trees, and refreshed with streams of running water. The Lyceum, where Aristotle taught, and which, from him, became the seat of the academic school, was situated on the other side of the city, beyond the Ilissus. It was used also as a theatre for gymnastic exercises. Near it was the less famous Cynosarges, where Antisthenes taught, the founder of the Cynic school.

The subsequent sects of Zeno and Epicurus taught within the city. Zeno chose the portico called Pæcile, which was embellished with representations of Athenian victories. Epicurus, fond at once of society and of rural scenery, was the first who introduced a garden within the walls; and thus enjoyed at once these two species of luxury.

Not only literary, but political associations conspired to give interest to particular districts of Athens. The hill of Areopagus, where that august assembly pronounced its decisions; the *Prytaneum*, or senate-house; the *Pnyx*, or forum, where the sovereign people of Athens met to deliberate: all these places, without being particularly splendid in themselves, become in the highest degree interesting to us, by the dignity and importance of the events of which they were the theatre.

poli- consti- on.

We have already given a view of the Athenian constitution, as originally established by Solon. This, however, will give a very inadequate idea of the effects produced by that system, when called into action. The popular branch, as we already observed, was not long of acquiring an ascendency, far beyond what he had either foreseen or intended. To this cause may be attributed, at once her prosperity, and the evils with which it was chequered. The activity, the emulation, the free scope to talents of every description, which were excited and afforded by a government so completely popular, were doubtless the grand causes which raised Athens to such a height of glory. The multitude of great men in every department, who followed each other in splendid succession, even to her last decline, is altogether unexampled. This constitution also combined with her military power, in rendering her the head of the popular interest in Greece, and thus necessarily secured the attachment of a majority of the members of every Grecian community. Thus she often conquered by her institutions, as much as by her arms; and was enabled, after conquering, to hold states in easy subjection. We have had sufficient occasion to observe those errors in foreign policy, into which the same constitution precipitated her; her rashness in engaging in enterprizes above her strength; her levity in changing from one to another; the perpetual jealousy and suspicion which she nourished against her great men,—a jealousy which her circumstances indeed might perhaps render necessary, but which often prompted her to reject their services at the time when they were most wanted. We have also had occasion to observe that ambitious and unprincipled avidity which she displayed in her transactions with foreign states, in which the maxim too often was, that every thing was lawful that was for the benefit of Athens. This was a maxim indeed but too prevalent among the ancient republics; yet Sparta seems generally to have maintained a character of equity decidedly superior to that of her rival. Accordingly the most upright among the Athenians, Aristides, Cimon, and Phocion, generally favoured the party of Sparta and aristocracy. On the other hand, the Athenians are more celebrated for humanity: Their treatment of slaves was milder than in other Grecian states; and the few instances of atrocity towards conquered states, seem to have been sudden bursts of passion, that were quickly followed by repentance.

In their internal economy, the energies of a free government were also, as we shall presently see, powerfully displayed in a career of science and art, the splendour of which has no parallel in the history of nations. At the same time it was productive also of a complication of disorders. The free states of antiquity differed from those of modern times, in not being representative governments. The popular assembly was composed of the whole body of the nation; which not only produced a disorderly multitude, but took away all check of responsibility, such as exists now between the electors and the elected. The people were absolutely despotic, and exercised their power often as arbitrarily and as capriciously as the most worthless individual. As most of the manual labour was performed by slaves, such of the free citizens as had no inheritance, that is, the greater part of them, were in a state of extreme necessity. When therefore they found, that the public revenue, as well as the property of private individuals, was at their disposal, they soon discovered, and were taught by their flatterers, that these resources might be turned to their private accommodation. This was gradually done more and more, every new courtier endeavouring to outstrip his predecessor. Theatrical amusements, of the utmost splendour, were afforded at the public expense; and a law was at length passed, making it capital to propose any other use of the funds appropriated to them. In the same manner, baths, places of meeting, and other accommodations, of more than royal magnificence, were supplied to the lowest of the people. Trials were decided by a species of jury, the members of which were called Dicasts, and received a small sum (three oboli, equal to fourpence) for the exercise of their office. To be on juries became thus a regular source of subsistence to the poorer classes; hence sprung innumerable abuses. The number of jurymen was raised to 500; that of courts, which sat daily, to ten. Every disposition was shewn, both to multiply trials, and to protract their duration. Accusations were willingly received; and so little was the security, even to the best citizens, of a favourable issue, that Socrates could give no better advice, than to repel them by a counter accusation. The greatest men of the state paid the most humble court to these dicasts. The comic poet introduces one of them saying: "The principal men of the commonwealth attend our levee in the morning. Presently one of those who have embezzled public money approaches, makes a low bow, and begs my favour. 'If ever,' says he, 'you yourself, in any office, or even in the management of a military mess, cheated your comrades, pity me.' He stood trembling before me, as if I had been a god." With the same view of accommodating the people, holidays, the sacrifices at which were distributed among them, were multiplied, till they filled nearly a sixth of the year.

While the revenue of the state was thus employed, rather for private than public wants, the question came to be, how the latter were to be supplied. With this view, the people cast their eyes on the rich, whom they were never disposed to regard very favourably. Was a frigate to be equipped; they pitched upon the man who appeared best able to afford it, and compelled him to do it at his own expense. The same system was adopted with regard to all other branches of public service. The only remedy which remained was of the most irregular nature. The man, on whom this burden was laid, could call upon any other whom he thought better able to bear it, either to do the service, or to make a complete exchange of property with himself. Upon the whole, Mr Mitford, who certainly shews no partiality to the Athenian government, hesitates not to declare, that the security of property in it was less than in the most arbitrary of the oriental governments.

Her progress in the arts and sciences.

Having thus surveyed the political character of Athens, we shall now take a brief view of that which she displayed in arts and letters. The first foundations of her fame in this department were laid under the family of Pisistratus. They shewed themselves zealous patrons of learning; and Pisistratus himself is said to have been the first who collected together the scattered fragments of the Iliad and Odyssey. The grand efforts of Athenian genius, however, were subsequent to this æra; it continued to blaze uninterruptedly during the whole period of her political greatness, and even for a short time survived its extinction. The departments in which she chiefly excelled, and to which, indeed, she gave birth, seem to have been those connected with human manners and passions—the drama, moral and political philosophy, and history.

To Athens the drama was indebted, at once for its first origin and its highest perfection. Yet her first essays were of the rudest description. At certain seasons of the year, festivals were celebrated in honour of Bacchus; and, on these occasions, it was customary for the peasants to mount their cars, and sing extemporary verses in honour of that deity. On some, who displayed, in this exercise, peculiar powers of amusing the public, rustic rewards, a cask of wine, or a goat, were bestowed; hence arose the expressions, *trugœdia*, *tragœdia*, the song of the cask, the song of the goat. These persons wore masks, a custom always retained on the Greek theatre; and, as they gradually improved, and dialogue was added, the exhibitions approached more and more to the nature of regular dramas. Athens now becoming a city of some magnitude and opulence, a demand arose in it for similar amusements, and persons were not wanting to gratify this taste. The division into comedy and tragedy had now been established. The first year before the establishment of the tyranny of Pisistratus, Susarion mounted a scaffold, and performed a sort of comedy, or satirical dialogue. About thirty years after, Thespis, from a waggon, exhibited the first tragedy on record. Before his time there had been nothing but the chorus; he added a single actor. Tragedy, though posterior in its origin to comedy, was soonest carried to perfection. Thespis was succeeded by Cratinas, in whose time the scaffolding, similar probably to that used in our puppet-shows, on which the exhibition was performed, having accidentally broke down, the Athenians applied themselves to build a secure and more elegant theatre. Phrynichus, his successor, perfected tragedy still more, by substituting the iambic verse for the trochaic, which had been employed as suited to the accompaniment of dancing, once an essential part of theatrical entertainments. The spectacles were now addressed to the fancy more than to the senses. Immediately after him, and about the period of the Persian war, arose Eschylus, who carried Grecian tragedy to the summit of perfection. His pieces are characterized by a fierce and terrible sublimity, congenial to his own character, and that of his age, which were wholly devoted to military glory. He was succeeded by Sophocles, who, born in a milder and more polished age, exhibited different characters. Inferior in energy and sublimity, he still combined a large portion of these qualities with more skilful contexture of plot, and greater powers of pathos. Immediately following, and for a long time contemporary, was Euripides, who excelled both his predecessors in pathetic powers, in which, among the ancients at least, he stands unrivalled; and who cultivated also a sententious morality unknown to his predecessors. In other respects, however, he is inferior to Æschylus and Sophocles.

With him tragedy, after a short reign, expired; but comedy had only now attained its perfection, and continued to flourish during successive ages. It assumed different aspects, according to the different periods of its existence. These are called the Old, the Middle, and the New Comedy.

The old comedy was cultivated by Eupolis, Cratinus, and Aristophanes. It employed itself in the most bitter, and often indecent satire, upon distinguished persons in the commonwealth, who were introduced by name upon the stage, and held up to public derision. The writings of Aristophanes alone have come down to us, and display a very powerful, but coarse vein of humour. After him, Alexis and Antiphanes introduced the middle comedy. The object of this was still satire, but the improved taste of the age, and the preponderating influence of the Macedonian government, no longer allowed the writers to indulge in personal attacks; it was therefore directed against manners in general. All the writers of this school, of whom Mr Cumberland has enumerated thirty-two, have perished, leaving only a few fragments, which make us regret the more what we have lost. The middle was followed by the new comedy, more cultivated, polished, and regular, than either of its predecessors, and nearly approaching, it would appear, to what we call sentimental comedy. It seems to have been chiefly occupied by love-plots, tender sentiments, and more delicate satire. Upwards of 200 names have been transmitted to us, of those who shone in this line of composition; but their names only, not their works, if we except a few scattered fragments, chiefly handed down by fathers of the church, and which therefore have a serious, and even gloomy colouring, probably very different from the general strain of these dramas. Menander, Philemon, and Diphilus, are the most celebrated of these writers.

The drama of Athens, however, is not more celebrated than its schools of philosophy. As every citizen might acquire an influence in the management of public affairs, provided he possessed the requisite qualifications, it became a desirable object to attain those talents, and above all that eloquence, which might enable him to sway the decisions of a popular assembly. A class of teachers then arose, by whom this was publicly professed; but the greater number of these, deserting their legitimate office, taught only the art of making subtle distinctions, and defending right and wrong indiscriminately. These went by the name of Sophists, which originally signified merely wise men, but which, from their misconduct, has long become odious. The abuses of this sect were exposed, and their fame eclipsed, by Socrates, the most celebrated of all heathen philosophers, for pure morality and practical wisdom. His instructions were entirely oral, and seem to have consisted chiefly in the application of sound sense and virtuous principle to the varied scenes of public and private life, of which he was a constant spectator. Openly attacking the pernicious doctrines of the sophist, and secretly despising the superstitions of the multitude, he excited hostility in both; and at length his unworthy fate became as much the shame, as his life had been the glory, of Athens. When death, however, had silenced envy, his fame broke forth in full lustre; and a crowd of votaries arose, who trod, or affected to tread, in his footsteps. Each, however, modifying and explaining the Socratic doctrines as suited his own peculiar views, many branches, widely differing from each other, sprung from the same root. Xenophon, the most judicious and most amiable of his disciples, seems to have transmitted his doctrine the most pure and uncorrupted. Plato, on the contrary, sought to elevate and adorn it by an admixture both with his own lofty, and often visionary ideas, and with the tenets of other schools. Hence he may be considered rather as having founded a system of his own, than as having faithfully transmitted to us that of his master. Amid a variety of subordinate sects, we may then distinguish the two opposite, at the head of which were Diogenes the cynic, and Aristippus the philosopher of pleasure. The former placed wisdom entirely in the absence of all refinement, and often even of common decency, and in a life marked only by austerity and privation. The other, conceiving man made only for enjoyment, sought it wherever it was to be found; and hence became a welcome guest in courts, and in all gay and opulent societies. These two were succeeded by the still more celebrated sects of Zeno and Epicurus, of which the former placed the supreme good in virtue, the other in pleasure alone, and which long continued to divide the ancient world. The leading doctrines of each are well known, and shall be fully explained in their proper place.

We may observe, that each of these moral systems was, in general, accompanied by a physical system, professing to account for all the grand phenomena of the universe. This last, however, being founded commonly on very imperfect and inaccurate observation, was of little comparative value. It would seem, on the whole, that no branch, either of physical or mathematical science, was much indebted to Athens. Living nature was there too varied and interesting, to leave much room for attention to its dead and inanimate portions.

History.

Where political events were so varied and important, the art of recording them was not likely to be neglected. Although Athens cannot boast of having produced the father of history, yet the most eminent of his successors sprung up in her bosom. Thucydides has left us a history of cotemporary events, free from all those partialities to which such a narrative might be supposed liable. His performance is a model of sound judgment, attic precision, and grave and severe eloquence. His successor Xenophon was, still more than he, versant in real life and in public affairs. His style, less nervous, is more simple, sweet, and flowing. In his Anabasis, and in his Grecian history (a continuation of that of Thucydides,) his fidelity is equally unimpeached; but in the Cyropedia, his refined moral taste has led him to wander into the regions of fiction, in order to delineate a more perfect model than real life could afford. With him expired the historic muse of Athens.

The fine arts.

Amid these higher pursuits, Athens was not less busily nor less successfully occupied in cultivating those arts, which relate to the beauty of external form. Painting and sculpture originated indeed, not there, but in the fertile and earlier civilized regions of Ionia, and the islands of the Ægean Sea. It was in Athens, however, and under the auspices of Pericles, that these arts attained their highest perfection. The fame of Phidias and Praxiteles as sculptors, of Zeuxis and Parrhasius as painters, is still unrivalled in their respective departments. All these indeed were not born in Athens, but it was there that their talents were chiefly formed and exerted. With the masterpieces of these artists Pericles lavishly adorned the public buildings and temples of Athens, and thus gratified at once the taste and vanity of his countrymen. All the works of Grecian painting have been swallowed up by time; but the ruins of Athens present remains of sculpture and architecture, which still astonish the world. The termination of Athenian liberty involved also that of the fine arts: in the age of Alexander, the school of Sicyon had already attained the pre-eminence.

Subsequent fortunes of Athens.

The political superiority of Athens ceased after the battle of Cheronea; yet gleams of her ancient spirit still occasionally broke forth. The death of Philip, which occurred soon after, appeared to present a favourable opportunity of throwing off the yoke; and it was embraced at once by Athens, by Thebes, and by the tribes of Thrace and Illyricum. But the young hero, having crushed his barbarous enemies, returned with the rapidity of lightning into Greece. Thebes suffered a dreadful punishment for her daring attempt; and a similar fate seemed to impend over Athens. With a magnanimity, however, worthy of her best days, she braved the prohibition issued by the conqueror against giving shelter to the exiles from Thebes. Yet Alexander, notwithstanding this additional provocation, consulted his fame, by extending clemency to so renowned a city.

During the victorious career of Alexander, Athens remained without any movement, even while Sparta, under the command of Agis, was making a vigorous, though unsuccessful, attempt at emancipation. A remnant of independence, however, appeared, by her deciding in favour of Demosthenes, the celebrated contest concerning the crown, (See DEMOSTHENES,) though she banished him two years afterwards, on a somewhat doubtful accusation of bribery. Alexander appears always to have shewn a peculiar favour to this city. Devoted to the pursuit of glory, he viewed Athens as the dispenser of it. The speech is well known which he made in passing the Hydaspes: "What dangers am I encountering, O Athenians, in order to be praised by you!" The decree, however, which he passed for the restoration of all the Grecian exiles to their respective cities, though humanity, as well as policy, might have prompted it, excited high indignation among a people so torn by party contests; and when it was immediately followed by the news of his death, the popular party easily gained the ascendency. Demosthenes, restored to his country, became again the soul of the Athenian councils. A confederacy was formed, with Athens at its head; and a numerous army was raised, to make head against that under the command of Antipater. Leosthenes, being appointed general, attacked the Macedonian commander, defeated and drove him into Lamia, a town of Thessaly, to which he immediately laid siege. Leosthenes fell before the town; but his successor Antiphilus routed a body of troops which had advanced to relieve it. Alarmed by these checks, Craterus hastened over with a band of those veterans who had conquered under Alexander. This was too hard a trial for the Athenian levies; they were vanquished; and at this single disaster, the whole confederacy fell immediately to pieces. Antipater marched directly to Athens, which submitted without resistance. Demosthenes was the victim of this revolution. Having fled to the island of Calauria, and taken refuge in a temple, he was surrounded by Macedonian officers, and, to save himself from falling into their hands, swallowed poison. Phocion, who had always resisted this rash ebullition, now sought in vain to save Athens from the ignominy of a Macedonian garrison. Twelve thousand citizens were disfranchised; the popular form of government was suppressed; and every measure was taken to hold her in the most strict and absolute subjection.

Death Demost nes.

A. C. 3

Thus Athens lost all that remained of her liberty; and she became from this period, as distinguished for the meanness of her adulation, as she had formerly been for the fierceness of her independence. Never did people run into such excesses of flattery. Every successive master who was imposed upon them, from the moment that he came into power, was fawned upon with the same abject servility. Antipater, on his death-bed, left the government of Macedon to Polysperchon, who acting, in every respect, contrary to his predecessor, espoused the popular interest among the states of Greece, and particularly in Athens. Phocion, who had been attached to Antipater and the opposite interest, became then the object of hostility to the new governor, who procured from the Athenians his condemnation and death. Thus Athens lost her last great man, in the same manner as she had lost so many of his predecessors.

Of Pho cion. A. C. 3

Polysperchon was not long of being driven out by Cassander, the son of Antipater, who re-established the old system, and set Demetrius Phalereus at the head of the government. The choice was excellent; and under this accomplished person, Athens enjoyed more quiet, and perhaps more real happiness, than during the days of her glory. Every species of honour was profusely lavished on him; insomuch, that while Miltiades, the deliverer of the state, was honoured only by a place in an historical painting, three hundred and sixty statues were decreed to Demetrius Phalereus. Yet when, after a sway of twelve years, he was dispossessed by Demetrius, the son of Antigonus, these statues were instantly thrown down, and all their adulation transferred to this new master. Demetrius here abandoned himself to every species of debauchery; and the Athenians dishonoured themselves completely by their servile compliance even with his most shameful propensities. Yet when, fortune changing, he soon afterwards sought refuge in their city, he found the gates shut against him. By another turn of affairs, he soon after became again master of the city, and, according to every appearance, the Athenians had to dread the severest effects of his vengeance. But Demetrius, an accomplished person, and ambitious of fame, sought rather to attach them by an ostentatious clemency. Yet when adverse fortune compelled him once more to seek refuge within her walls, he failed not to experience a second repulse.

Demetr Phalere

A. C. 3 Demetr Poliorc

Athens now, amid the struggle of contending potentates, enjoyed, for some time, a precarious independence. This, such as it was, seems to have infused a portion of her ancient spirit. An inundation of Gauls, under the command of Brennus, poured down upon Greece, which they prepared to enter by the straits of Thermopylæ. The Athenians took the lead in the confederacy of Grecian states formed to oppose them; and Brennus, after a desperate effort, found the barbarous strength of his troops insufficient to contend with the superior skill and valour of the Greeks. He was forced to relinquish his enterprize, and to content himself with laying waste the northern districts.

This last glimmering, however, of her ancient glory, was quickly extinguished. Antigonus, the son of Demetrius, having ascended the throne of Macedon, determined to avenge on Athens the injuries of his father: he laid siege to it therefore with a
68. powerful army; and, notwithstanding the efforts made by the other states, and even by Ptolemy of Egypt, he at length succeeded in compelling it to receive a Macedonian garrison.

The Achaian republic now began its splendid career; during the whole of which, Athens remained in inglorious tranquillity. In the wars, however, which immediately succeeded between Rome and Macedon, she makes some small figure. She even gave occasion to the second Macedonian war. Two Acar-
on. nanian youths had been put to death by the Athenians, for some venial offence committed at their sacred rites. The Acarnanians, having in vain demanded satisfaction, obtained permission from Philip to lay waste Attica, in which they were aided by some Macedonian troops. The Athenians, without making any attempt to defend themselves, appealed to the Romans, who, eager for a pretence to make war upon Philip, availed themselves of this event. Attalus and the Rhodian ambassadors, then in alliance with Rome, happening to pass near Athens, appeared in the city, and were received with the most extravagant honours.

Athens, however, took little share in the war which she had kindled, but derived a precarious security from the hostility of contending powers. The form of liberty was for a time confirmed to her, by that decree which gave freedom to all the Grecian states. But when Rome, having reduced Macedon to subjection, no longer kept terms with the other states, Athens, along with them, was reduced into a province, under the title of Achaia. She does not even appear to have shared in the gallant resistance made by the Achaian republic. What followed, however, some time after, shewed, that there was still some remnant of her ancient spirit. Mithridates, the renowned enemy of Rome, had openly raised the standard against that power, and had commenced hostilities by an indiscriminate massacre of all the Romans who were settled in Asia. From that moment, Athens hailed him as her deliverer. Rome, distracted by faction, was supposed to be in no condition to enforce her dominion. The complete triumph, however, of Sylla over Marius, fatally deceived this expectation. The former general marched directly into Greece, inflamed with the most furious thirst of vengeance. All the states submitted, except Athens; and therefore against it the Roman general advanced without delay. Athens made a resistance beyond expectation, and not unworthy of her ancient fame. The city and the Piræus, which formed separate fortresses, were then in different hands. The former was commanded by Aristion, who is represented as a violent and profligate character, but who appears evidently to have possessed great energy and activity. The Piræus was held by Archelaus, an officer of Mithridates, possessed of distinguished merit and ability. Sylla spared no efforts to overcome this unexpected resistance. To construct his machines, he levelled all the sacred groves around Athens, nor spared even the Academy and the Lyceum. He plundered the treasures of Delphi, without regard to the sanctity which had so long been attached to them. Yet every attempt which he made to reduce the place by storm, was completely baffled, and he was compelled to have recourse to blockade. Having succeeded in demolishing part of the long walls which joined Athens to the Piræus, the city, deprived of communication with its harbour, soon began to be straitened for subsistence. Treachery completed what force had begun; the supplies of Athens were entirely cut off; and she began to experience all the horrors of famine. Aristion desperately resisted every proposal of surrender; but at length the citizens, either through fatigue or disaffection, ceased to keep the same strict watch as formerly. Sylla, observing this, prepared a midnight attack, which, finding them completely unprepared, soon made him master of the city. Exasperated at their long defence, he gave full vent to the ferocity of his character. Not only was the city given up to indiscriminate plunder; but orders were issued, that every Athenian, of every age and sex, should be put to the sword. The city streamed with Athenian blood; and scarcely, of her whole population, did a feeble remnant survive. Archelaus, seeing the city lost, judged it necessary to evacuate the Piræus. Sylla, thus deprived of human victims, vented his impious fury on the structures, the pride of Athens and of Greece, with which that port was adorned. The fairest edifices of the city had been defaced; but the Piræus was completely levelled with the ground.

Siege of Athens by Sylla.

A. C. 86.

On the few occasions in which the Athenians took any share in the civil wars of Rome, they were still faithful to the cause of liberty. They espoused the part of Pompey against Cæsar; and again, on the death of Cæsar, they threw down his statues, and in their stead set up those of Brutus and Cassius, which last they placed next to those of Harmodius and Aristogiton. After the battle of Philippi, when there remained no longer any party friendly to liberty, Athens, in the division of the empire between Octavius and Antony, fell to the share of the latter. The profuse and thoughtless gaiety of his character, seems even to have conciliated the affections of the people. After his last departure from Rome, he fixed his residence for some time among them, and was received with all that servile flattery which they were accustomed to lavish on the favourite of the moment. By a refinement of adulation, they proposed his marriage with Minerva, their tutelar deity; to which Antony, with artful waggery, consented, on condition that she should bring him a portion of

Athens.

ten millions of drachmas, (300,000*l.*) Augustus punished this attachment to his rival, by depriving Athens of her few remaining privileges, and of the island of Ægina, which she had received from Antony.

Athens a [illegible]

But while Athens thus saw every trace of her political existence vanish, she rose to an empire, scarcely less flattering, to which Rome itself was obliged to bow. Her conquerors looked to her as to the teacher and arbiter of philosophy and science. All the most distinguished Roman youth were ambitious of literary accomplishments; and all flocked to Athens, in order to acquire them. Several even preferred its tranquil and elegant pleasures to the tumult of the capital; and among these was Atticus, the celebrated friend of Cicero, who received that surname, from having fixed his residence at Athens.

The tyranny of the twelve Cæsars, being exercised chiefly against the nobles and senators of Rome, did not fall very heavy on this, or the other cities of Greece. Germanicus, under Tiberius's reign, bestowed on it the valued privilege of having a lictor to precede the magistrates. Even Nero conferred a nominal liberty upon it, along with the rest of Greece; and it is remarkable, that this gift was revoked by Vespasian. But it was in the golden age of the Roman empire, that Athens was destined to resume, in regard to outward appearance at least, her former splendour. Adrian, that singular character, ambitious to perpetuate his name by monuments of art, chose Athens as his favourite residence, and lavished treasures in adorning it. He built several temples, and, above all, he finished that of Jupiter Olympius, the work of successive kings, and one of the greatest productions of human art. He founded a splendid library. He bestowed also many municipal and other privileges. The Athenians repaid his benefits with their accustomed profusion of gratitude. An inscription, placed on one of the gates, declared Athens to be no longer the city of Theseus, but of Adrian.

Under Adrian, and the Antonines.

The Antonines trod in the footsteps of Adrian. Under them, Herodes Atticus devoted an immense fortune to the embellishment of the city, and the promotion of learning. He was at the head of a species of university, founded by Adrian, and the professors of which were increased by Marcus Aurelius to thirteen. There were two for each of the four sects of philosophy, two rhetoricians, two civilians, and a president. Handsome salaries were attached to these appointments.

Schools of Athens.

Amid the accumulated calamities of the Roman empire, the taste for learning and the arts suffered a gradual decline. Yet to those, who still cherished it, Athens continued to be the centre of resort. Being shut out, however, from all concerns of business, or of public life, her teachers lost entirely that sound and manly character, which they once possessed, and sunk into mere pedants and sophists. A sort of mystic fraternity seems to have been formed, admission into which was gained by a variety of childish ceremonies; while the initiated were distinguished by a peculiar dress, in which no one else was allowed to appear. Clokes and staves, a long beard, and a book in the left hand, were everywhere to be seen; and all the walks were full of parties engaged in argument.

Athens was also distinguished as the last retreat of paganism. Philosophy, which had formerly been rather hostile to superstition, proved now its only support. Her pride had never brooked the humility and the absence of worldly wisdom, which characterised that divine dispensation. Instead of acknowledging the purity of its doctrines and precepts, she employed a preposterous ingenuity in drawing a veil over the deformities of the pagan mythology. It was at Athens that Julian was supposed to have imbibed that enmity against Christianity which distinguished his reign. As, however, the ancient religion more and more declined, the credit of Athens declined along with it. Under the succeeding emperors, she experienced the most mortifying neglect, and at length her schools were entirely shut by Justinian.

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It was not, however, merely in the decline of learning, and of the ancient religion, that Athens felt the calamities of the Roman world. Already, in the first invasion of the Goths, in the middle of the third century, Athens was selected as a victim. The fleet of those barbarians anchored in the Piræus. Attempts had been made to repair the walls, which had been allowed to fall into decay. They were unable, however, to resist the impetuous attack of the Goths. Athens was taken, and plundered. Dexippus, meanwhile, a brave officer, having hastily collected a body of troops, unexpectedly attacked, and drove them out of the city with considerable loss. It is reported that, during this visit, the Goths, having collected all the libraries of Athens, were preparing to burn them; but one of their number diverted them from the design, by suggesting the propriety of leaving to their enemies what appeared to be the most effectual instrument for cherishing and promoting their unwarlike spirit. Serious doubts, however, are entertained as to the truth of this anecdote.

Greece now enjoyed a long respite from foreign war, till the weak reign of Arcadius and Honorius, when a still more dreadful tempest burst upon her. Alaric, that ferocious and terrible chief, after overrunning the rest of Greece, advanced into Attica, and found Athens defenceless. The whole country was converted into a desert; but it seems uncertain whether he plundered the city, or whether he accepted the greater part of its wealth as a ransom. Certain it is, that it suffered severely; and Synesius, a contemporary, compares it to the mere skin of a slaughtered victim.

After the devastations of Alaric, and still more, after the shutting of her schools, Athens ceased almost entirely to attract the attention of mankind. The pursuits of industry, however, seem to have been carried on with some activity: Besides the honey of Mount Hymettus, there seems to have been a pretty considerable manufacture of silk; since, in 1130, a colony was transported from Athens to Sicily, with the view of introducing that branch of industry into the latter country.

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Latins

After the taking of Constantinople by the Latins, in the beginning of the thirteenth century, the western powers began to view Greece as an object of am-of the pedestals and inscriptions are found scattered in different quarters, and often half buried in the earth.

The temple of Theseus is still nearly entire, except the roof, which is modern. The sculptures on the outside are almost entirely defaced, but those which adorn the friezes on the inside, are in better preservation. They represent the exploits of that hero. His combat with a Centaur is particularly distinguished.

Of places which derive their interest from the scenes which were acted in them, considerable remains may also be observed. In the hill of Areopagus, where sat that famous tribunal, we may still discover, the steps cut in the rock, by which it was ascended; the seats of the judges; and opposite to them, those of the accuser and accused. This hill is now a burying-place for the Turks, and is covered with their tombs.

The *Pnyx*, or place for the assembly of the people, which lies near the Areopagus, is still nearly in its original condition. In it are still seen the pulpit for the orators cut out in the rock; the seats of the secretaries, who drew up the decrees; and, in the two angles, those of the officers, who imposed silence, and published the result of the public deliberations. Niches are also seen, where were placed the offerings of those who obtained from the people either favour or acquittal. Awful sensations are inspired by the view of this once grand and busy scene, whence issued those schemes, which changed so often the face of the ancient world.

We may still trace the area of the *Stadium*, built by Herodes Atticus entirely of white marble, and on which the Athenian youth were employed in those gymnastic exercises so much valued by the Greeks. The site of the *Lyceum* is discoverable by a number of loose stones scattered about. A modern house and garden now cover the site of the *Academy*. Within its precincts the walks of the Peripatetics may yet be traced; and many olive trees remain, of a most venerable antiquity.

The long walls are entirely demolished; but their foundations may still be traced under the shrubs which cover the plain. The Piræus, another Athens, retains scarcely a memorial of its ancient greatness. Only a few scattered fragments of columns are found in it, as well as in the two neighbouring harbours of Munychia and Phalerum. A few small craft now frequent this famed port, for the accommodation of which there is a paltry custom-house.

Inhabitants of Athens.

Athens contains now from eight to ten thousand inhabitants, one-fourth of whom are Turks, and the rest Greeks. The latter enjoy a milder lot, than in most other places subject to Turkish dominion. They have had recourse to an expedient not very honourable, that of chusing for their protector the Kislar Aga, or chief of the black eunuchs, to whom they pay a tribute of thirty thousand crowns. They have been known also to rise and inflict bloody vengeance on their oppressors. They are distinguished both by address, and by a spirit of liberty, rarely now observable among their countrymen. Even some forms of their ancient constitution are still preserved. Chandler, on entering Athens, was met by an *archon*. The Turks have here abated somewhat of their usual lordliness and austerity, and mixed more intimately with the subject people.

The Greeks have an archbishop, who enjoys a tolerable revenue; and no less than two hundred places of worship.

By far the most recent and accurate survey of Athens, is that made by Lord Elgin, during his embassy at Constantinople. The detailed result will, we trust, in some form or other, be given to the public; in the meantime, the following notice may be interesting:

Exertions of Lord E gin to reco ver the re mains of Athenian sculpture and architecture.

Even before leaving England, Lord Elgin had understood, that the most acceptable service which he could render to the arts, would be to procure *casts* of the most interesting remains of sculpture and architecture, which still existed in Athens. But the expense of engaging artists from this country was too great for an individual to undertake, and an application for assistance from government proved ineffectual. In Sicily, however, where he touched on his passage to Constantinople, he was more fortunate: To the most eminent artist of that island, the troubled state of Italy enabled him to add others, of very uncommon abilities, from Rome. In this manner he engaged six artists; one general painter, one figure painter, two *formatori* for the making of the casts, and two architects. With these Lord Elgin, after much difficulty, obtained from the Turkish government permission to proceed to Athens. They spent three years there, mutually assisting and controuling the operations of each other, and taking measurements and representations of every object which seemed deserving of attention.

The measurements have been made in the utmost detail, and with extreme care and minuteness. From the rough drafts, plans, elevations, and finished drawings of the most remarkable objects have been executed. In these, all the sculpture has been restored, with uncommon taste and ability. The bas reliefs, besides, on the different temples, have been drawn, with perfect accuracy, in their present state of mutilation and decay. Most of these bas reliefs, and all the characteristic architectural features in the different monuments now remaining at Athens, have been moulded; and the casts and moulds being conveyed to London, are now in his lordship's possession. Picturesque views of Athens, as well as various parts of Greece, have been taken by one of the most eminent painters of Europe.

Besides these models and representations, Lord Elgin collected also numerous pieces of Athenian sculpture in statues, reliefs, capitals, cornices, friezes, &c. The advantages which he possessed enabled him to accumulate a greater collection of these than exists elsewhere in Europe. In making this collection, he was strongly animated by seeing the destruction into which these remains were sinking, through the influence of Turkish barbarism. Some statues in the *posticum* of the Parthenon had been pounded down for mortar, on account of their affording the whitest marble within reach; and this mortar was em-necessarily became, at last, more a matter of exhibition than of practice; since few could hope to succeed, or wish to embark, in a contest with regular bullies. The training and habits now acquired, were not those of men qualified for enduring every privation, and every species of exertion in the field; but of performing idle feats in one situation at home.

During the best periods of Greece, all the youth were regularly trained to the exercises of the palæstra. In every town there was a gymnasium, or school, for these and other branches of juvenile education, supported at the public charge, and furnished with baths, courts, race-grounds, and every other convenience. To these seminaries, the youth repaired at a very early period; for we find, that even in the great games, at which all Greece appeared, boys of 12 years of age obtained prizes. The discipline to which these were subjected, would naturally be suited to their tender age; but those who were more advanced, and, particularly, who intended to signalize themselves at any of the public exhibitions, underwent a course of training, admirably well calculated for the sinewy contest. This preparation, which sometimes occupied a space of ten months, was extremely rigorous; and, being prescribed by law, was indispensible. The outlines of it are given by Horace:

> *Qui studet optatam cursu contingere metam,*
> *Multa tulit fecitque puer; sudavit et alsit,*
> *Abstinuit Venere et Baccho.*

Epictetus also, in the following passage, takes notice of the preparatory discipline. "You must conform to rule, eat against your will, abstain from dainties: you must necessarily be exercised at the appointed hour, in heat and in cold; you must drink no cold water, and sometimes no wine. In short, you must give yourself up to the superintendant as to a physician, and then turn out to the contest. Here it is not unfrequent to dislocate an arm, to sprain an ancle, to swallow a quantity of dust, to be flogged into the bargain, and after all to be vanquished."

The diet of the professed athletæ, in Italy as well as Greece, was strictly attended to. In the more early ages, they were fed on new cheese, dried figs, and boiled grain. At length, one Pythagoras, the master of a gymnasium, introduced the use of animal food, having observed that it gave more firmness and body to the muscles. Pork, either roasted or broiled, was the favourite dish for this purpose; and was found of so nutritious a quality, according to Galen, that the athletæ who intermitted the use of it but for one day, were sensible the next of a material diminution of their vigour. Their breakfast consisted of a little dry bread, which was always unleavened: and their principal meal, which was after their exercises, consisted principally of animal food: and this, on some occasions, they were forced to devour in prodigious quantities. As a dry diet was considered of essential importance to the strength and solidity of the muscular system, their drink, consisting of warm water, or of a thick luscious kind of wine, was administered in very sparing quantities. The method of feeding, however, admitted of considerable variations, adapted to the particular case of the pupil; for, as a racer and a boxer required different qualifications, so also the whole of their regimen was somewhat different.

The athletæ were allowed as much sleep as they chose, since this was thought conducive to that rotundity of body which they deemed so necessary. In the morning they went occasionally into the cold bath, for the purpose of bracing their sinews: and, after their exercises were over, they were immersed in a tepid bath, where they were carefully scrubbed with the strygil: they were then dried with towels, and anointed with oil. After this, they took their principal meal, and engaged in no more exercise that day.

Their medical treatment was simple, though rather peculiar. Glysters were sometimes administered, when the appetite seemed to flag: but the favourite remedy for this was an emetic, which was thought to be less debilitating than cathartics. The finger or a feather served, by tickling the fauces, to excite vomiting. Sexual intercourse was strictly prohibited, as peculiarly detrimental to strength; and plates of lead were applied at night to the groins, to repress improper affections. Their backs, too, were occasionally scourged, till the blood flowed: this was intended both for habituating the patient to bear the acutest pain, and as an antidote against plethora, to which these men were peculiarly liable.

The athletæ were daily exercised, for many hours, in every species of exertion; and, to the eternal reproach of Grecian delicacy, in a state of complete nudity. There were, indeed, female athletæ, and these, according to all accounts, were decently dressed, and contended in classes by themselves; though, if we may believe Ovid, both these formalities were dispensed with in ancient Sparta. Paris writes thus to Helen:

> *More tuæ gentis nitidâ dum nuda palæstrâ*
> *Ludis: et es nudis fœmina mista viris.*

The male champions originally wore a small scarf round the middle, which, in after times, was laid aside as an incumbrance: there are some authors, however, who deny this, and assert, that the covering was always retained, except perhaps in the case of wrestling. The excellence of the Grecian sculpture has been attributed, and probably with justice, to these naked exhibitions, where every muscle and sinew was displayed in every possible variety of action. But what was this advantage, when compared with the horrid effects which we know to have been produced on the minds and on the conduct of the spectators?

The exercises to which these men were trained were of the most laborious and hardy description. It is not our intention here to enter into a detail of all the amusements and arrangements practised in the ancient shows; this will be done with more propriety under some other title, as GLADIATOR, OLYMPIC GAMES, &c. We shall here, therefore, restrict ourselves to a short account of those exercises properly denominated athletic, and which were not only practised in every gymnasium, but exhibited in public, on innumerable occasions, in every town and district of Greece. These then consisted of the following kinds:

1st, *Leaping.*—Those who contended in this ancient sport had weights attached to their bodies, to give a greater momentum to their exertion, and to swing them forward. The weight was sometimes attached to the head, or shoulders, but generally carried in the hand, when it had holes for the admission of the fingers. We are not informed that height was aimed at in the leap, which was directed to a hole, or ditch, in the ground; and into this it was sometimes the grand object to alight.

2d, The *Foot-Race.*—Swiftness of foot was one of the most enviable qualities in the eyes of the ancients. Homer uniformly ascribes it to his great hero Achilles, and elsewhere praises it as one of the most valuable endowments of nature:

> No greater glory can be e'er attain'd,
> Than what strong hands or nimble feet have gain'd.

David praises Saul and Jonathan on the same principle: "they were swifter than eagles." Those who professed this sport had short buskins, or sandals, to protect their feet; and they sometimes ran in complete armour. They are said to have found means to contract, by the actual cautery, the size of the spleen, which was deemed an impediment to velocity. The perfection to which some of the champions attained in this game, is described by the Greek bards with the most poetical extravagance. In an epigram in the *Anthologia*, the racer is feigned to have become invisible from his excessive swiftness, and to have only reappeared when he halted at the end of his course.

3d, *Darting.*—The instrument generally employed here was a javelin, or pole. These were discharged sometimes from the naked hand, and sometimes with the help of a thong tied about the middle of the weapon. This exercise also included archery, and perhaps slinging.

4th, *Quoiting*, or throwing the *Disc.*—Here the instrument was a heavy mass of stone, brass, or iron. It was taken up in one hand, between the thumb and fingers; was thrown under the arm like our common quoit; and being, in general, exceedingly smooth, and convex on both sides, was grasped and retained with considerable difficulty. In this game, as in our *putting-stone*, there was but one disc to a company; and the contest was, not as in our quoits, who should hit a particular object, but who should throw to the greatest distance.

5th, *Wrestling.*—Previously to this exercise, which was carried to the utmost perfection by the Greeks, the naked combatants were rubbed all over with oil, or with a composition called *ceroma*, consisting of oil, wax, and dust. This, while it secured the skin, by making it soft and pliant, and also prevented excessive perspiration, occasioned, at the same time, a degree of lubricity, which greatly increased the difficulty and the variety of the contest. To correct, however, in some degree this inconvenience, the champions rolled themselves in the dust of the palæstra. When they were people of condition, they used odoriferous unguents instead of oil, and were sprinkled with a fine sand, or dry earth, brought from Egypt and Italy. In wrestling, every stratagem was allowed for throwing down the antagonist: such as tripping up his heels, twining round his limbs, and squeezing his ribs together; but kicking and boxing were strictly prohibited. A victory was obtained by giving three falls; but if, in falling, the vanquished drew down his opponent along with him, the contest was either begun anew, or continued on the ground, when he who got uppermost was the conqueror.

6th, The *Pentathlon.*—In addition to the five simple exercises which we have now shortly described, there was another called *five-games*, consisting of all these in close succession, in the order in which they are mentioned in the following line:

> Αλμα, ποδωκειην, δισκον, ακοντα, παλην.
>
> The leap, race, disc, the dart, and wrestling play.

Some authors believe boxing to have been sometimes introduced into the pentathlon, and that this was a name for a series of any five games. This opinion, however, is not generally adopted. As a peculiar course of training was necessary for this game, a pentathlete seldom succeeded in any of the simple contests of which it was composed. It is spoken of by the ancients as being a very tedious and difficult contest.

7th, The *Cæstus.*—The games of which we have hitherto treated were common to all Greece; but the two *sports* which follow were prohibited by the Lacedemonians, not, however, on account of their cruelty, but by reason of a condition imposed upon the vanquished, that they must declare themselves worsted. This ignominious confession was deemed inconsistent with the Spartan character. The first of these exercises was what we may term boxing, a game which, in its original state among the Greeks, was, like that practised among ourselves, a contest of bare fists; but which, by gradual *improvements*, and the introduction of the *cæstus*, assumed an aspect peculiarly frightful. In this advanced stage of the science, the fingers and hand were wound up in thongs of raw bull-hide, which were sometimes continued up to the elbow; and to this offensive and defensive contrivance were often added pieces of lead or iron; so that the human hand was thus converted into a species of hammer. In the first edition of Dryden's *Virgil*, there is a print representing the cæstus in a different manner; for there each of the combatants holds by the end a long tapering bag of leather, supposed to be stuffed with lead or iron; and, with these massy sacks, in the form of a Hercules's club, the heroes are belabouring each other with alternate strokes. The armed glove, however, seems to be the true idea of the cæstus, which, when wielded by a brawny arm, must have produced dreadful devastation in the physiognomy of the antagonist. To close up an eye, or derange a little the structure of the nose, were in those days but trifling exploits,—when men got their jaws demolished at a single blow, their ears torn off their heads, and every frontal protuberance converted into a depression. The heroes in this contest, it is true, wore a stiff cap to protect their heads, and were generally swelled, by feeding, to an enormous size, for the purpose of shielding their bones from injury; but, with all these precautions, they were sadly mangled, as the following lines will testify:

> This victor, glorious in his olive wreath,
> Had once eyes, eye-brows, nose, and ears, and teeth;
> But turning *cæstus-champion* to his cost,
> These, and (still worse) his heritage he lost:
> For by his brother sued, disown'd at last,
> Confronted with his picture he was cast.

8th, The *Pancratium*.—This name, which may be literally translated *all-fights*, was applied to a game, compounded, at pleasure, of almost all the possible modes of annoyance which two naked men, without weapons, could exercise towards each other. In this exercise, boxing and wrestling were the most prominent features, accompanied, however, with an infinite number of subordinate varieties, as kicking, elbowing, rolling on the ground, throttling, scratching, and squeezing. In short, the combatants were turned out, in a complete state of nature, only lubricated with oil, to avail themselves freely of all their proper resources, and to exert every joint, muscle, and limb, for the defeat of their antagonists. To this great freedom of choice, indeed, there were a very few *humane* exceptions. Thus they were not allowed to put out an eye, as is frequently done in the American pancratium; nor to bite off the flesh, which they pressed between their teeth; nor to strike under the ribs with the ends of their fingers; nor, in short, to kill their adversaries designedly. There was a pancratiast named Sostratus, who was successful near twenty times in the public games. His method, the most humane on record, was this: he always seized the fingers of his antagonist, crushed them into one bloody mass, and thus obliged him to resign the palm! See Hom. *Il.* l. xxiii.; Virg. *Æn.* l. v.; *Pausan.* l. vi. viii. et passim.; Epict. *Enchir.* c. 29.; Cælius Rhodig. *Ant. Lect.*; Potter's *Antiq.* v. i.; West's *Dissert.*; and Sir John Sinclair's *Code of Health*, v. ii. (E)

ATHLONE, a town of Ireland, situated partly in the county of Westmeath, and partly in the county of Roscommon. It stands on the river Shannon, which separates the counties, over which there is a long bridge with many arches. On the bridge are several ill executed figures and inscriptions, celebrating the success of Queen Elizabeth, and giving an account of the execution of the rebels. Athlone was long the residence of the lord presidents of Connaught, who kept their courts of justice in it. The castle was built by King John, on a round hill like a Danish fort, on the Roscommon side of the river. Notwithstanding the advantageous situation of Athlone for trade, it is still in a poor and ruinous state. W. Long. 7° 49′, N. Lat. 53° 21′ 30″. See Beaufort's *Memoir of a Map of Ireland*. (*j*)

ATHOL, a mountainous district in the north of Perthshire in Scotland. See PERTHSHIRE. (*w*)

ATHOR, or ATHYR, the name of one of the divinities of the Egyptians, signifying Night, to whom they erected temples. (*j*)

ATHOS, a mountain of Macedonia, famous in ancient history and poetry. It is situated between the Strymonic and Singitic gulfs, on a mountainous promontory, which is connected with the continent by an isthmus of land about twelve leagues broad. The promontory stretches a great way out into the Ægean Sea, and occasions a long and dangerous circumnavigation. Of the numerous mountains of which this peninsula is composed, Athos proudly towers above all the rest: its conical summit, at times white with snow, is seen by the mariner at the distance of 100 miles; and, though the cold is excessive, it is adorned with plants and trees, chiefly of the fir kind, which climb up its steep sides to a great elevation.

Marvellous stories have been told by the ancients of this celebrated mountain. Unfortunately that portion of Strabo's excellent work is lost, in which he had occasion to describe Athos, and which is poorly supplied by a dry epitome. According to Mela, its height was such as to reach above the clouds. Others have affirmed that it was six miles high, that it soared beyond the regions of rain and tempest, and that ashes, left on its top, continued dry and undisturbed. But the most wonderful story of all is that of the projection of its shadow, which was reported to extend, at the summer solstice, as far as Lemnos, an island, according to Pliny, 87 miles off, or, according to modern calculation, about 30. It is said that a brazen cow was erected at the termination of the shadow, in the market-place of Myrina, the principal town of Lemnos, with this inscription:

Αθων καλυπτει πλευραν Λημνιας βοος.

i. e. "Athos covers the side of the Lemnian cow." Modern travellers are not agreed about the real height of this mountain. Some make it two miles in perpendicular height; while others reduce its extreme elevation to about 3300 feet. The truth is, that no accurate measurement has yet been made.

Athos, if we may believe the ancient historians, opposed considerable resistance to the power of Xerxes, on his march to Greece. A part of that monarch's fleet having suffered shipwreck off the Athose promontory, he resolved to prevent similar accidents for the future, by cutting a channel through the mountain, sufficient to admit two gallies abreast, each of three banks of oars. By this operation, several cities are said to have been separated from the continent, as Olophyxus, Dion, Thysus, Acrotheon, and Cleone; whence we may conclude that this rugged peninsula was well peopled in ancient times. The Greek writers ascribe the most capricious conduct to the Persian king. Thus, according to these authorities, Xerxes, on making his bridge of boats across the Hellespont, ordered a quantity of fetters to be thrown into the sea, as symbols of the subjection of that stormy element; and on its rebelling against his authority, by throwing his boats into confusion, he rebuked it in an angry speech, which began thus: "Thou salt and bitter water." On the present occasion, the same mad tyrant sent a letter to the mountain, couched in the following language. "Athos, thou proud and aspiring mountain, that liftest up thy head to the skies, I advise thee not to be so audacious as to put rocks and stones in the way of my workmen: if thou opposest me thus, I will cut thee entirely down, and throw thee headlong into the sea." But these accounts can hardly be credited. If Xerxes really made a canal across the isthmus, it must have been much longer than the Greeks reported it. But as no vestiges are now discoverable of so magnificent a work, the whole story has been called in question:

> *Perforatus* Athos, *et quicquid Græcia mendax*
> *Audet in historia.*

We must not here omit the daring proposal of Stasicrates, an engineer in the service of Alexander, who offered to convert the whole mountain into a statue of that prince. The enormous figure, which must have been in a sitting posture, was to hold a city in its left hand, containing 10,000 inhabitants, and in the right, an immense basin, whence the collected torrents of the mountain should issue in a mighty river. But the project was thought to be too extravagant, even by Alexander.

Mount Athos is now peopled by a numerous horde of Greek monks, denominated Caloyers, who are of the order of St Basil. These devotees, who amount to 6000, fare very hardly, abstaining entirely from flesh, and subsisting chiefly on pickled olives. They were at one time distinguished for their learning, at least for possessing several valuable manuscripts, and for their numerous copies of the Scriptures, to transcribing which, they applied themselves with much laudable assiduity. Though now extremely illiterate, so much so that they can scarcely read or write, they have the merit of being sober, peaceable, and industrious: and these qualities have procured for them the good opinion of the Turks, who afford them protection and sustenance. They have twenty-four monasteries situated on different parts of the mountain, raised in stories to a great height, and surrounded with walls; and these buildings, interspersed with churches, hermitages, and some fortifications, on which are mounted some pieces of artillery, give an extraordinary appearance to this lofty eminence, and present, to the eye of the traveller, as he approaches the scene, a most picturesque object, and a pleasing specimen of manual industry. Mount Athos is now called Hagiosoros, or Monte Santo, from the reputed sanctity of its inhabitants. It is in 40° 10′ N. Lat. 24° 45′ E. Long.

See *Herodot.* l. vi. c. 44.; l. vii. c. 21. &c. Plut. *in vitâ Alexand.* Ælian. *de Anim.* l. xiii. c. 20. *Lucan.* l. ii. v. 672. *Plin.* l. iv. c. 10. Strab. *Epit.* l. vii. Mela *de Sit.* Cellarii *Geog.* Belon *Observ.* l. i. c. 25. (E)

ATHY, a town in the county of Kildare, in Ireland, situated on the river Barrow, which is navigable to the sea. A branch of the great canal from Dublin to the Shannon joins the Barrow at Athy. The exports from the adjacent country to Dublin amount annually to £20,000, and consist of corn, coals, flour, butter, and potatoes. Number of houses 550. Population 3300. W. Long. 7° 1′. N. Lat. 52° 9′. See Beaufort's *Memoir of a Map of Ireland*, and *Anthologia Hibernica*, vol. i. (*j*)

ATLANTIC OCEAN, the name of that immense tract of sea which separates the western shores of Europe and Africa from the eastern shores of North and South America. An account of Mr Kirwan's theory of the formation of the Atlantic may be seen in the *Transactions of the Royal Irish Academy*, vol. vi. p. 228. (*w*)

ATLANTIS, an island mentioned in Plato's Timæus, as situated beyond the Pillars of Hercules, and surpassing in extent Asia and Africa taken together. Many consider the whole account as an idle fable, not deserving of the least attention. Perizonius, and others, consider it as a proof that the ancients had some obscure knowledge of America: whilst others suppose, that it refers to an immense island or continent formerly existing in the place now occupied by the Atlantic ocean. We shall lay before our readers an abstract of the original account as given in the Timæus, and then shall advert more particularly to the several opinions entertained respecting it. Critias, one of the speakers, professes to have heard the account from his grandfather, who received it from Solon, and this latter learned it from the Egyptian priests, when he studied under them in Egypt. The sum of their accounts is this: that the vast island of Atlantis was situated near the straits of Gades: that it was governed by a race of mighty conquerors, who subdued all Africa as far as Egypt, and all Europe as far as the Tuscan sea. In succeeding ages, however, owing to prodigious earthquakes and inundations, the Atlantic island was suddenly absorbed into the bosom of the ocean, which for many ages afterwards could not be navigated, on account of the numerous rocks and shelves with which it abounded.

There is so much of the marvellous and improbable in this account, that but a moderate share of incredulity is necessary to make us reject the whole as a fable. The information comes to us in a very roundabout way, and from a very suspicious quarter; and it would not be very safe to receive as authentic history, the *ipse dixit* of an Egyptian priest.

There are circumstances, however, which have induced some to think that this Atlantic island is no other than the continent of America. Ammianus Marcellinus affirms, that the account recorded by Plato is no fable. Crantor also, Plato's first interpreter, considers it as a true history. It is admitted that there is an error in the account, as to the proximity of the island to the Straits of Gibraltar: for Diodorus Siculus informs us, that the Phœnicians in early times, sailing beyond the Pillars of Hercules, were carried by storms and tempests far to the west, till they fell in with a vast island, having navigable rivers and a fruitful soil. It is thought that the Atlantis of Plato, and this island mentioned by Diodorus, can be nothing else than the continent of America; and that the account of the submersion of this vast island arose from the circumstance of its becoming, in course of time, entirely unknown to the ancients.

But many naturalists, among whom are Buffon and Whitehurst, have thought it probable, that such an island or continent as that described by Plato actually existed, and that the Canary islands, the Azores, and Teneriffe, are nothing else than the summits of mountains belonging to such an island or continent submerged, and the fragments of an antediluvian world, consumed and shattered by earthquakes and volcanic eruptions. Whitehurst is of opinion, that the Atlantic island of Plato, was probably the portion of land which, stretching from the north of Ireland, extended to the Azores, and from the Azores to the continent of America. He thinks that the Giant's Causeway, and the abrupt cliffs which environ part of the Atlantic ocean, are a sufficient demonstration, that some violent disruption of the earth has taken place in that quarter at some remote period of the world. We shall let him speak for himself on this subject.

"These circumstances render it necessary to observe, that whosoever attentively views and considers these romantic rocks, together with the exterior appearances of that mountainous cliff, will, I presume, soon discover sufficient cause to conclude, that the crater, from whence that melted matter flowed, together with an immense tract of land towards the north, have been absolutely sunk and swallowed up into the earth, at some remote period of time, and became the bottom of the Atlantic ocean: A period indeed much beyond the reach of any historical monument, or even of tradition itself. But though it does not appear, that any human testimony, or record, has been handed down to us concerning such a tremendous event, yet the history of that fatal catastrophe is faithfully recorded in the book of nature, and in language and characters equally intelligible to all nations, and therefore will not admit of a misinterpretation; I mean the range of lofty abrupt cliffs which environs a part of the Atlantic ocean.

These are characters which cannot mislead, or divert our attention from the true cause thereof; and we may further add, as a collateral testimony, that subterraneous fires have frequently burst open the bottom of that ocean in various parts, and have formed new islands of considerable magnitude; whence it is evident that the same cause still exists, and produces similar effects. I say, the consideration of such disasters, together with that of the causes still subsisting under the bottom of that immense ocean, almost persuade me to conclude, that Ireland was originally a part of the island Atlantis, which, according to Plato's Timæus, was totally swallowed up by a prodigious earthquake, in the space of one day and night, with all its inhabitants, and a numerous host of warlike people, who had subdued a considerable part of the known world." See the *Timæus* of Plato. *Un. Hist.* vol. xviii. p. 250. Buffon's *Nat. Hist.* vol. ix. p. 162. Whitehurst's *Inquiry*, p. 258. Maurice's *Hist. of Hindostan*, vol. i. p. 538. (*g*)

ATLAS, a chain of mountains in the north-west of Africa, called in the Arabic *Jibbel Attils*, or the *Mountains of Snow*. This chain of mountains is inhabited by the various tribes of Berebbers, and extends from (Jibbel d'Zatute) Ape's Hill on the Mediterranean to Shtuka and Ait Bamaran in Lower Suse, passing at the distance of 30 miles to the east of Morocco, where they are of an immense height, and covered with eternal snow. This part of the range appears in a clear day like a saddle when seen from Mogodor, a distance of 140 miles, and it is visible at sea to vessels several leagues off the coast. These mountains, though extremely cold in winter, are salubrious and pleasant. The vallies are well cultivated, and the mountains having the advantage of various climates, abound in excellent fruits, and extensive forests. The contrast between their snowy summits and the rich verdure below, gradually decaying as it approaches the limit of congelation, has a very singular and picturesque appearance. In the part of the great chain which passes by Morocco to the east there are excellent mines of copper, and the branches which traverse the district of Suse produce silver, copper, iron, lead, and sulphur of saltpetre. They have also mines of gold mixed with antimony and lead ore. According to the Moors, there are many quarries of marble granite, and other valuable rocks in this extensive range. The Berebbers, who inhabit the upper regions of Atlas, live from November to February inclusive in excavations in the mountains. See *Pliny*, lib. v. cap. 1; *Strabo*, lib. xvii; Shaw's *Travels in Barbary*, p. 5; Lempriere's *Journey to Morocco*, p. 75; Chenier's *Present State of Morocco*, vol. i. p. 13; Pinkerton's *Geography*, vol. iii. p. 815; but particularly Jackson's *Account of the Empire of Marocco*, 1809, p. 10. (*o*)

ATLAS, the name of that joint or vertebra of the neck which is nearest the head. See ANATOMY. (*w*)

ATMOMETER, ATMIDOMETER, or ATMEDOMETER, from *ατμος*, *vapour*, and *μετρον*, *a measure*, the name given to an instrument for measuring evaporation. An ingenious instrument of this kind has been described by the celebrated Professor Richman, in the *Nov. Comment. Petropol.* vol. ii. p. 121. (*w*)

ATMOSPHERE, that invisible elastic fluid which surrounds the earth, and encloses it on all sides. It received its name from the Greeks, in consequence of the vapours which are continually mixing with it. The ancients considered it as one of the four elements of which all things were composed, and some of them seem to have thought that it enters as a constituent principle into other bodies, or at least that air and other bodies are mutually convertible into each other. (*Lucret.* lib. v. 274.) No experiments on its nature could well be made by the ancients, as they were unprovided with every instrument fitted for such investigations, and unacquainted with the principles upon which their construction depended. But it has occupied a great deal of the attention of modern philosophers, and has given birth to some of the most brilliant discoveries that grace the annals of science. Its weight was first ascertained by Galileo, and applied by Torricelli to explain the rise of water in pumps, and of mercury in barometrical tubes, and by Paschal to the mensuration of the height of mountains. Its elasticity was accurately determined by Boyle, who may be considered as in some measure the founder of the science of pneumatics. Halley and Newton explained the effects produced on it by moisture. Hooke, Newton, Boyle, Derham, pointed out its relation to light, to sound, and to electricity. Its effect upon combustibles and animals was investigated by Boyle, Hooke, Mayow, Hales, Priestley, Scheele, and Lavoisier. Its constituents were detected and measured by the experiments of Priestley, Scheele, Lavoisier, and Cavendish. The effect of heat on it was determined by Shuckburgh, Dalton, and Gay Lussac. But it would be an endless task to enumerate all the philosophers who have distinguished themselves by their investigations of the atmosphere, a list which would include almost all the celebrated names of the last century.

ific ity r.

From the experiments of Sir George Shuckburgh Evelyn, (*Phil. Trans.* 1777 and 1798,) made with a degree of precision and patient industry, which perhaps have never been surpassed, it appears, that at the temperature of 60°, when the barometer stands at 30 inches, the specific gravity of atmospherical air is 0.001208, that of water being 1.000, or its weight is to that of water as 1 to 828. Hence 100 cubic inches of it under that pressure and at that temperature weigh 30.5 grains: For a cubic inch of pure water at that temperature weighs 252.506 grains, according to experiments of Shuckburgh corrected by Mr Fletcher. (Nicholson's *Journal*, iv. 35.) The result of the experiments of Lefevre Gineau, who was employed by the French government to ascertain the weight of water, in order to fix their standard of weights, was somewhat different. According to him, a cubic inch of water at 60° weighs 252.72 grains troy. The difference may be partly owing to some small error in the allowance of the expansion of water from 40°, the temperature at which his experiments were made, to 60°. At any rate, the known precision, and the excellent apparatus of Sir George Shuckburgh, entitle his result to the preference. Hawksbee's experiments make air 850 times lighter than water, the barometer being at 29.7, and Dr Halley supposed it about 800. But neither of these numbers is to be put in competition with the result of Sir George Shuckburgh given above. The air when weighed, is supposed to be in its usual state of dryness; when very moist, its specific gravity is diminished. An exact knowledge of the weight of a given bulk of air is of great importance, because it enables us with much facility to ascertain the weight of all other aërial bodies: for it is easy to determine the relative weight of any elastic fluid to that of air.

xansion heat.

When heat is applied to atmospherical air, its bulk increases; while cold, on the other hand, diminishes its bulk. As this change in bulk is very considerable, it affects very much the accuracy of all experiments on it. It has therefore been an object with philosophers to determine the precise amount and rate of the change in bulk produced upon air by heat. M. De Luc, Sir George Shuckburgh Evelyn, General Roy, Mr Dalton, and Mr Gay Lussac, are the gentlemen to whom we are indebted for the solution of this problem. In examining the dilatability of air by heat, it is necessary that no water be in contact with it. For as heat converts water into vapour, this vapour mixing with the air, would destroy the accuracy of the results, and make the dilatation appear much greater than it really is. According to the experiments of De Luc, air at the temperature of 55° when heated 1° of Fahrenheit's thermometer, expands $\frac{1}{483}$ part; according to Shuckburgh, the expansion is $\frac{1}{435}$; according to General Roy, it is $\frac{1}{437}$; according to Dalton, it is $\frac{1}{483}$; and according to Gay Lussac, $\frac{1}{480}$. As Dalton and Gay Lussac were at pains to exclude moisture, we may consider their experiments as more accurate than those that preceded them. As to the rate of expansion, General Roy found it a slowly diminishing ratio from 32° to 212°. Mr Dalton found the same thing. But he considers this diminution as apparent only, and not real, and owing to the expansion of mercury not being equable. According to him, water, mercury, and all liquids, expand as the square of the temperature, reckoning from the freezing point of the respective liquid. According to this notion, the expansion of air, (and indeed of all permanently elastic fluids,) is in geometrical progression to equal increments of temperature. The following Table exhibits the rate of expansion of air from 32° to 212°, according to Mr Dalton:

Degrees of Fahrenheit.	Bulk of Air.	Degrees of Dalton's Thermometer.
32°	1000	32
39.3	1017.9	42
47	1036.1	52
55	1054.7	62
63.3	1073.5	72
72	1092.7	82
81	1112.3	92
90.4	1132.2	102
100.1	1152.4	112
110	1173.1	122
120.1	1194	132
130.4	1215.4	142
141.1	1237.1	152
152	1259.2	162
163.2	1281.8	172
175	1304.7	182
186.9	1328	192
199.2	1351.8	202
212	1376	212
359.1	1643	312
539.8	1962	412
754.7	2342	512
1000	2797	612
1285	3339	712

The reader will observe, that the expansion of air in the second column of the Table constitutes a geometrical progression, the ratio of which is 1.0179. The third column exhibits the corresponding degrees of a Fahrenheit's thermometer graduated, according to Mr Dalton's notion of the expansion of mercury, according to the square of the temperature. This notion of Dalton must be allowed to be very ingenious. Unfortunately we are not in possession of any mode of ascertaining how far it is correct. It is only supported by analogical reasoning, and cannot well be otherwise in the present state of our knowledge of heat.

Composition of the atmosphere

Atmospherical air was long considered as a simple elementary body. But it is now known to consist of at least four distinct substances, namely, oxygen, azote, carbonic acid, and aqueous vapour. The first two substances must be considered as its essential constituents, and constitute in fact almost the whole of it. The other two are variable in their proportion, and exist only in minute quantities, which it is difficult to appreciate.

History of the discovery.

The first knowledge of the composition of the atmosphere must have been after the period of the discovery of oxygen gas by Dr Priestley in 1774. Lavoisier, indeed, in his posthumous works, appears to insinuate a knowledge of it in 1772. But this claim cannot be admitted, as he gives no hint of any such knowledge in his volume of essays published after that period, and as he was entirely unacquainted with oxygen gas when Priestley shewed him the way to prepare it at Paris, about the end of 1774. It is very probable that Lavoisier became acquainted with the composition of atmospherical air not very long after that period; though some years elapsed before he made it known to the public. Whether he preceded Scheele in his knowledge of this important fact, we do not exactly know. But there is no doubt whatever, that Scheele's investigations were carried on without any assistance from abroad, and that it was in consequence of the publication of his *Treatise on Air and Fire,* that the chemical world became acquainted with the nature and composition of atmospherical air. This important work was printed at Upsal in 1777, with an introduction by Bergmann, and translated into English by Dr Foster in 1780. The experiments of Priestley indeed would have warranted the conclusions respecting the composition of atmospherical air drawn by Scheele; but those of Dr Priestley were different and more complicated. In Scheele's first experiments, he estimated the bulk of oxygen gas in air at 30 per cent. But in the year 1779, he published a set of experiments continued for a whole year, in order to ascertain whether the bulk of oxyen in air be constant, or varies with the season of the year. He found it in general remarkably constant, and amounting to 27 per cent. The smallest bulk was 24, and the greatest observed was 30 per cent. Dr Priestley had made similar experiments, and had estimated the bulk of the oxygen at $\frac{1}{5}$th of the air, or 20 per cent. Mr Lavoisier's experiments, which were very numerous and varied, almost coincided with those of Scheele. He considered air as composed of 27 parts by bulk of oxygen, and 73 of azote. Mr Cavendish's experiments were published in the Philosophical Transactions for 1783. He proved decisively, that the proportion of the azote and oxygen in the atmosphere does not vary; and by a very careful analysis, concluded, that 100 parts of air in bulk are composed of

79.16 azote
20.84 oxygen
———
100.00

Bulk of oxygen and azotic gas.

This opinion was not at first acceded to by chemists, misled by the previous conclusions of Scheele and Lavoisier; and it was not till towards the commencement of the 19th century, that the true proportion of these constituents was generally known. The experiments of Berthollet in Egypt and in Paris, seem to have led the way to it. These were almost immediately confirmed by those of Davy, Beddoes, and many other chemists. At present it is universally admitted, that atmospheric air never varies in its composition; that it is the same in all places, and in all seasons; and that it consists in bulk of

79 azote
21 oxygen
——
100

proportions almost exactly the same with those originally settled by Mr Cavendish.

Properties of oxygen.

Oxygen gas is undoubtedly the most important of the constituents of the atmosphere, and indeed one of the most remarkable substances in nature, and highly worthy of the investigation of the chemist. Dr Priestley, its original discoverer, gave it the name of *dephlogisticated air*, Scheele called it *empyreal air*, Lavoisier called it at first *highly respirable air*, then *vital air*, and at last *oxygen gas*, because he considered it as the acidifying principle. It possesses the mechanical properties of common air; combustibles burn in it with great brilliancy; and animals can breath it much longer than the same quantity of common air. If the specific gravity of common air be reckoned 1.000, that of oxygen gas, according to the experiments of Kirwan and Lavoisier, is 1.103; according to Davy, 1.127; according to Fourcroy, Vauquelin, and Seguin, 1.087; and according to Allen and Pepys, 1.090. These results do not differ much from each other, except that of Mr Davy. His oxygen was obtained from the black oxide of manganese, and might perhaps contain a little carbonic acid gas. If we exclude his, the average of the other three is 1.093. This may be considered as near the truth as can well be attained. Rating its specific gravity at 1.093, 100 cubic inches of it, at the temperature of 60° when the barometer stands at 30 inches, will weigh 33$\frac{1}{5}$ grains troy.

Properti of azote.

Azotic gas, the other constituent of atmospherical air, is chiefly recognised by its negative qualities. It possesses the mechanical properties of air; it does not support combustion; and no animal can breath it without death. It constitutes the base of nitric acid, and is one of the constituents of ammonia. There is reason to consider it as a compound body, but hitherto chemists have not been able to ascertain its constituents; though several extraordinary phenomena, observed during the decomposition of ammonia by Davy and Berzelius, cannot well be accounted for, without supposing hydrogen to be a constituent of it. It has been supposed a compound of hydrogen and oxygen; but several circumstances militate against this opinion. Mr Davy has been for some time occupied incessantly in attempts to ascertain its composition, but hitherto without success. Till the discovery be made, some of the most interesting parts of chemistry remain involved in impenetrable obscurity. The specific gravity of azotic gas, according to Kirwan, is 0.985, that of air being 1.000; while, according to Lavoisier and Davy, it is 0.978. This last estimate we are disposed to consider as most correct. If so, 100 cubic inches of it, at the temperature of 60° when the barometer stands at 30 inches, weigh 29.83 grains troy.

Relati weigh the co stitue

Reckoning the specific gravity of oxygen gas 1.093, and that of azotic gas 0.978, and supposing atmospherical air to be composed of 79 parts of azote and 21 oxygen by bulk, it follows, that 100 parts of it in weight are composed of

77.43 azote
22.57 oxygen
———
100.00

Eudi ter.

Though it has been ascertained, that these two constituents of air never vary in their proportions, yet as the methods of analysing air are very useful in all chemical investigations of gaseous bodies, and have led to many discoveries of importance, it will be proper to give an account of them here. They consist in the application of various substances to a given bulk of air, which have the property of absorbing and removing the oxygen, but which do not act upon the azote. The diminution of bulk gives the quantity of oxygen; the residue that of azote. The apparatus contrived for these experiments, received the name of *eudiometers*, because they were considered at first as measurers of the *goodness* of air. For it was supposed that the proportion of oxygen was variable, and that the salubrious or noxious qualities of the air depended upon that proportion. Ingenhousz thought he discovered, that the atmosphere above the sea contained more oxygen than that above the land; hence he accounted for the supposed salubrity of the sea air, which has been highly extolled from the remotest times.

The first eudiometer was applied, in consequence of Dr Priestley's discovery, that nitrous gas absorbs the oxygen from common air. When nitrous gas comes in contact with oxygen gas, they immediately combine and form nitric acid; and if the mixture be standing over water, the acid is immediately absorbed by the liquid. Hence the bulk of a mixture of nitrous gas and common air immediately diminishes, and the diminution is proportional to the quantity of oxygen in the air, supposing all other circumstances the same, and of course measures that quantity. Dr Priestley's method was, to let up into a graduated tube 100 measures of air, and then to add 100 measures of nitrous gas. The mixture became yellow, and its bulk diminished. He denoted the goodness of the air by the residual gas. Thus if 114 parts remained, he said that the goodness of the air, by the test of nitrous gas, was 114; of course the smaller the residue, the greater was the goodness of the air. This method did not ascertain the absolute quantity of oxygen. It was soon observed, that even when the air operated upon was absolutely the same, the residue was liable to considerable variation from apparently trifling circumstances. Thus, for example, if the tube was agitated during the mixture, it was observed that the residue was always much less than if no agitation was applied. If the tube was narrow, the residue was always more considerable than if the tube was wide. The purity of the water, too, over which the experiment was made, had considerable influence. Mr Cavendish observed, that if the water was in such a state, that it frothed when agitated as if it had contained soap, then the residue was always less than it otherwise would be.

The apparatus was much improved by Fontana, who regulated the size of the tube and the manner of mixing the gases; hence the instrument is usually known by the name of Fontana's eudiometer. This eudiometer was employed by Ingenhousz, and the variations which he found in the compositions of the atmosphere, were obviously owing to the errors to which it was liable. Mr Cavendish first pointed out the precautions necessary, in order to ensure accuracy when this eudiometer was employed. But before nitrous gas could be used with advantage in the analysis of air, it was necessary to ascertain the proportion of it which combined with a given bulk of oxygen gas. This was first undertaken by Mr Dalton, (*Phil. Mag.* xxiii. 351.) According to him, 21 parts of oxygen gas are capable of uniting either with 36 measures of nitrous gas, or with $2 \times 36 = 72$ measures. Both of these compounds are soluble in water. If the tube in which the mixture is made be wide, and if agitation be employed, the two gases come at once in contact, so that the oxygen combines with a maximum of nitrous gas. If the tube be narrow, and if no agitation be employed, the oxygen gas combines with a minimum of nitrous gas. In tubes of intermediate bore, the proportion of nitrous gas which combines with the oxygen, is intermediate between 36 and 72. Hence his rule is to employ a tube of so small a bore, that water can just be poured easily out of it; to put up into this tube the quantity of air to be examined, and then to let up a quantity of nitrous gas equal to about half the bulk of the air; to allow this mixture to remain two or three minutes without any agitation, and then to observe the diminution of bulk. This diminution is to be multiplied by $\frac{21}{57}$, or 0.368. The product is the bulk of the oxygen gas contained in the air examined. Suppose we employ 100 measures of air, and let up 50 measures of nitrous gas, and that the diminution of bulk amounts to 57; then $57 \times 0.368 = 20.976$, or very nearly 21. This indicates, that the 100 measures of air contain 21 measures of oxygen gas. We have tried the method of Dalton very frequently, and have found that when the tube is sufficiently narrow, and the experiment carefully made, the mean error cannot be rated higher than 1 per cent. When the gas examined contains much more oxygen than common air, and above all, when it is almost pure oxygen, the error is greater; so great, indeed, that the method cannot be depended on.

But though Dalton's method is correct, as far as the analysis of atmospherical air is concerned, there can be little doubt that the proportions which he has assigned as the limits in which oxygen gas and nitrous gas combine are incorrect. We have made many trials to ascertain these limits, but never could obtain the proportions given by Mr Dalton. Mr Gay Lussac has lately turned his attention to this subject, and has given a very simple and satisfactory account of the proportions in which the two gases combine, (*Memoires D'Arcueil*, tom. ii. 233.) In a paper which he published on the combination of gaseous bodies, he shewed, that in all cases they unite either in equal bulks, or one part in bulk of one with two or three parts of another, and in no intermediate proportions. This opinion was obviously founded on a very ingenious hypothesis of Mr Dalton, relative to the way in which substances combine. This led him to examine the combination of oxygen gas and nitrous gas. The result was, that 100 parts of oxygen gas unite either with 200 or with 300 parts of nitrous gas. The first compound constitutes nitric acid, the second nitrous acid. His method of analysing air, founded upon this discovery, is to let up 100 measures of air into a wide vessel, and then to add 100 measures of nitrous gas. In about a minute the absorption is completed. No agitation is to be employed. The fourth part of the diminution gives the oxygen. Suppose the diminution to amount to 84, the fourth of that number, or 21, represents the oxygen in 100 parts of air. On repeating this experiment, we found it pretty exact, provided the diameter of the glass vessel employed be not less than three or four inches. In narrow vessels it is very inaccurate.

Volta's eudiometer.

The second kind of eudiometer was first proposed by Volta, and hence is usually known by the name of Volta's eudiometer. It consists in mixing 100 parts of the air to be analysed with 100 parts of hydrogen gas in a graduated tube, and passing an electric spark through the mixture. A detonation takes place; the whole of the oxygen, and part of the hydrogen, being converted into water. This method is very easy, and is susceptible of great precision. From numerous and decisive experiments, it follows, that one part of oxygen combines with two parts of hydrogen, when the experiment is made in this way. It appears, too, that the whole oxygen disappears, provided the quantity of hydrogen present be sufficient. We have only to mix 100 parts of air and 100 parts of hydrogen gas together, detonate the mixture, and observe the diminution of bulk. The third part of that diminution indicates the quantity of oxygen present. Suppose, with the preceding proportions, that the diminution of bulk amounts to 63, the third part of that number, or 21, indicates the quantity of oxygen gas in 100 parts of air. He must be a careless experimenter, that, with this eudiometer, commits an error of 1 *per cent.* We therefore consider it as one of the best means of determining the proportion of oxygen gas present in any gaseous mixture. It does not answer quite so well when we use it to ascertain the purity of oxygen gas, or of a gas composed chiefly of oxygen; because, in that case, the diminution of bulk in the gaseous mixture is so sudden and so great, that a vacuum is formed, and the water over which the experiment is made lets go a portion of air, which mixes with the residue, and makes it appear greater than it otherwise would be, and, of course, diminishes the proportion of oxygen which the gas really contained. This error is diminished if the water has been recently boiled. We cannot state the amount of this error; though we have convinced ourselves that it often exceeds 2 *per cent.*

De Marti's and Davy's.

Another method of analysing air, is to expose 100 measures of it to a solution of sulphuret of lime, or of sulphate of iron saturated with nitrous gas. The first of these liquids was recommended by De Marti, the second by Mr Davy. They both answer very well; they gradually absorb the whole of the oxygen, and leave the azote: Hence the diminution of bulk gives the oxygen in the air examined. The absorption may be made in a graduated tube, or in a eudiometrical instrument contrived for the purpose by Mr Pepys, and described in the Philosophical Transactions for 1808.

Berthollet's.

The last method of analysing air which we shall mention, is that of Berthollet. It consists in placing 100 measures of air in contact with a cylinder of phosphorus. This method succeeds very well in warm weather; but it does not answer at all in winter. We have kept a cylinder of phosphorus for a fortnight in contact with air, at a temperature a little above the freezing point, and the air only lost about 3 *per cent.* of its bulk; but if you bring it near the fire, the phosphorus soon absorbs the whole oxygen. When the thermometer stands at 70°, the absorption is completed in a few hours. You know the completion by the phosphorus ceasing to smoke. The oxygen, by this process, is removed; but as the azote dissolves a portion of the phosphorus, its bulk is a little greater than it ought to be. According to Berthollet, to obtain the true bulk of the residuary azote, you must diminish it by $\frac{1}{42}$d part. This method is not so convenient as the preceding, at least in this country, because it is so tedious; but it is sufficiently accurate.

The third constituent of the atmosphere is carbonic acid gas. Its presence in the atmosphere was recognised as soon as Dr Black had ascertained the cause of the difference between mild and caustic alkalies: For it was known, that a caustic alkali soon becomes mild by exposure to the air. Dr Black ascertained, that the *mildness* is owing to the absorption of carbonic acid. From the observations of Saussure we learn, that this gas exists in the atmosphere on the summit of Mount Blanc, which is nearly 16,000 feet above the level of the sea; for lime-water soon deposited its lime in the state of carbonate, when exposed upon the summit of that mountain, (Saussure's *Voyages*, iv. 199.) Humboldt found it in a quantity of air brought down by Garnerin from a height of 4280 feet, to which he had ascended in an air balloon, (*Jour. de Phys.* xlvii. 202.) It appears, therefore, to constitute a part of every portion of the atmosphere to which we have access.

As this acid gas is produced in great quantities by combustion, respiration, fermentation, and many other of the most common processes of nature, one would be disposed to believe, at first view, that its quantity must be constantly increasing. But this does not appear to be the case, it must therefore be decomposed and separated from air as fast as it is formed. It is of so deleterious a nature, that, if it were to accumulate to any extent, it would render air incapable of supporting life. A candle will not burn in air contaminated with one-ninth of carbonic acid gas.

The quantity of this gas in air is small. Many attempts have been made to ascertain it; but the process is so difficult, that absolute precision cannot be looked for. It was long believed that the carbonic acid present in the atmosphere amounted to one *per cent.* Humboldt made many experiments on the subject, and concluded from them, that its bulk varied from one *per cent.* to half a *per cent.* But this determination is certainly excessive. According to the experiments of Mr Dalton, a quantity of air, equal in bulk to 102,400 grains of water, contains a quantity of carbonic acid just capable of saturating 125 grains of lime-water: 70 measures of carbonic acid gas would produce the same effect: Hence he concludes, that the atmosphere contains $\frac{1}{1400}$th part of its bulk of carbonic acid gas, (*Phil. Mag.* xxiii. 354.) This quantity we consider as rather below the truth. Mr Cavendish has shewn, that lime-water is not capable of depriving air completely of carbonic acid gas: Hence a portion would still remain in Mr

Dalton's experiment. Perhaps we shall not err far if we state the bulk of carbonic acid gas in the atmosphere at $\frac{1}{1000}$th part.

The 4th constituent of the atmosphere is water in the state of vapour. That water forms a constituent part of the atmosphere, has been known in all ages, and indeed is demonstrated by the rain and dew which is continually falling, and by the great quantity of moisture which sulphuric acid, potash, and other bodies, absorb when exposed to the atmosphere. The quantity of moisture in the atmosphere has been observed to vary greatly at different times, and various instruments have been invented to measure that quantity. These instruments are called *hygrometers*. The most ingenious of them are those of Leslie, Saussure, and De Luc.

It was at first supposed, that the water in the atmosphere was still in the state of water, and that it was held in solution in air precisely as salts are dissolved in water. But it has been at last established by satisfactory experiments, that the water in the atmosphere is in the state of vapour. To De Luc, Saussure, and Dalton, we are chiefly indebted for these experiments.

As to the quantity of water which exists in the atmosphere, it depends upon a variety of circumstances, the investigation of which belongs to that branch of science called METEOROLOGY; to which, therefore, we refer. Saussure found that a cubic foot of air, saturated with moisture at 66°, contains about 8 grains troy of water, or $\frac{1}{67}$th of its weight. Supposing air always saturated with moisture, the quantity always increases with the temperature, because the elasticity of aqueous vapour increases with the temperature. Hence, in cold weather, the quantity of vapour in air is always small; whereas, in warm weather, it is often considerable. In the torrid zone the aqueous vapour in the atmosphere is capable of supporting from 0.6 to 1 inch of mercury. In Britain it is hardly ever capable of supporting 0.6 inch of mercury; but in summer it is often capable of supporting 0.5 inch, while in winter it often does not exceed 0.1 inch. From these facts it follows, that the weight of water present in the atmosphere varies from $\frac{1}{80}$ to $\frac{1}{100}$ of the whole. Mr Dalton supposes, that the medium quantity of vapour held in solution at once in the atmosphere, may amount to $\frac{1}{70}$th of its bulk.

These four bodies, oxygen, azote, carbonic acid, and vapour, are the only known constituents of the atmosphere. It cannot be doubted, that other bodies are occasionally present in it. The dreadful effects of marshy situations upon the health of the inhabitants, and the fatal rapidity with which certain diseases are propagated, cannot well be accounted for, without supposing that certain substances which produce a deleterious effect on the animal economy, are occasionally present in the atmosphere. But hitherto no method has been discovered of ascertaining the presence of these bodies, and subjecting them to examination. They are too subtile for our apparatus, and altogether escape the cognizance of our senses. It has been ascertained, however, that certain acid fumes, as those of the muriatic acid, nitric acid, and above all, of the oxymuriatic acid, have the property of destroying these miasmata, or at least of preventing them from producing deleterious effects on the animal economy. (c)

Physical properties of the atmosphere.

Having considered in the preceding paragraphs the dilatation of atmospherical air by heat, and its chemical composition, we shall now proceed to give a brief and general view of its physical properties, reserving the full discussion of the subject to the article PNEUMATICS.

Gradation in the density of the atmosphere

That atmospherical air is a heavy, compressible, and elastic substance, may be proved by many simple and direct experiments. A bladder filled with air is heavier than when it is in its flaccid state. When subjected to compression, it may be made to occupy a smaller space; and when that pressure is removed, its elasticity enables it to resume its original size. Since the air is heavy, the lower strata of the atmosphere are compressed by the weight of the superincumbent mass. The lowest stratum supporting the weight of almost the whole atmosphere, will be more dense than the rest; and the superior strata will gradually become more rare, in proportion to the weight which they sustain. The air in the higher regions, therefore, will be extremely rare, on account of its elasticity, which is not checked by any superincumbent pressure. If the air were perfectly elastic, it is obvious that there would be no limit to its expansion, and that the whole atmosphere would be dissipated through infinite space. The elasticity of the atmosphere must consequently diminish in a greater ratio than the weight which compresses it, and there must be a certain state of rarity at which its elasticity ceases. Upon the supposition that the rarity of the air is reciprocally proportional to its superincumbent weight, it may be demonstrated, that if the heights in the atmosphere be taken in arithmetical progression, the rarity of the air at these heights will be in geometrical progression, or, what is the same thing, the altitudes in the atmosphere are as the square roots of the corresponding rarities. Hence we have a method of measuring differences of altitude, by ascertaining with the barometer the rarity of the air at two places whose vertical distance is required. A full account of this method will be found under the article BAROMETER.

Weight of the atmosphere.

The weight and pressure of the atmosphere may be ascertained by very simple experiments. If we immerse in water a glass tube open at both ends, the water included in the tube will be on the same level with the fluid which surrounds it. When we apply our mouth to the upper end of the tube, and draw out the air, the included water instantly ascends till the weight of the elevated column added to the elasticity of the remaining air, exactly balances the pressure of the atmosphere on the surrounding fluid. If we now take a long tube, 40 feet long for example, shut at one end, and having filled it with water, plunge the open end into a vessel of water, the fluid will then descend in the tube till the weight of the column exactly equals the pressure of the atmosphere; for the air is now excluded from the upper part of the tube, and the weight of the column of fluid is the only force which is left to balance the weight of the atmospherical column. By making this experiment, it will be found that the water stands at from 34 to

35 feet above the general level of the surrounding fluid, and therefore the weight of a column of air reaching to the top of the atmosphere, is equal to the weight of a column of water, of the same base, with the altitude of 34 feet, or about 21564½ pounds on a square foot, or 15 pounds on every square inch. This experiment may be more easily made by using quicksilver instead of water. The quicksilver will rise to the height of 29 inches in the tube, and will thus measure the pressure of the atmosphere. Hence it follows, that the whole atmosphere exerts the same pressure on the surface of the earth, as if the surface of the globe were covered with water to the depth of 34 feet, or with quicksilver to the depth of 29 inches. This pressure has been computed at 12,022,560,000,000,000,000 pounds, or as equivalent to that of a globe of lead 60 miles in diameter; and if we suppose that a man's body exposes a surface of nearly 15 square feet, he will sustain a pressure of 32343¾ pounds, or 14½ tons.

Variations in the pressure of the atmosphere.

From the changes which take place in the atmosphere, its pressure is liable to very considerable variations. The column of quicksilver which we have shown to be a measure of that pressure, varies from 28 to 31 inches. The cause of these changes, which are yet but imperfectly known, will be considered under the article METEOROLOGY.

Height of the atmosphere.

If the atmosphere were of uniform density, it would be easy to ascertain, with the utmost accuracy, the height to which it extends; for the height of the atmosphere would obviously be to the height of the mercury in the barometer, as the specific gravity of common air is to [illegible] specific gravity of mercury. By making the calculation on this supposition, it will be found that the height of the atmosphere is a little more than 5 miles. As the air, however, gradually diminishes in density, the atmosphere must reach to a much greater distance from the earth than 5 miles. It appears from the duration of twilight, that at the height of 44½ miles, the atmosphere is sufficiently dense to intercept the light of the sun, and reflect it to the earth. We are therefore entitled to conclude, that it extends to a much greater height.

Refraction of the atmosphere.

When a ray of light enters the atmosphere, it is bent from its course by the same cause which refracts the rays of light when they pass through any dense medium, such as glass or water. The refraction sustained by light at its first entrance into the atmosphere must be very small, from the extreme rarity of the air. The deviation, however, will gradually increase as it penetrates the denser strata, and the ray will describe a path increasing in curvature as it approaches the earth. From this property of the atmosphere, the apparent altitude of the sun, moon, and stars, is greater than their real elevation, and they appear to be raised above the horizon when they are actually below it. The refraction of the atmosphere near the earth's surface is liable to very considerable anomalies. A very extraordinary phenomenon arising from this cause has been described by Mr Vince. The castle of Dover, concealed by the hill which lies between it and Ramsgate, appeared, on the 6th of August 1806, as if it had been brought over and placed on the side of the hill next to Ramsgate. This phenomenon must have arisen from some variation of density in the intermediate air. Phenomena of the same class with the preceding have been illustrated experimentally by the ingenious Dr Wollaston. See *Edinburgh Transactions*, vol. vi. p. 245.; and *Phil. Trans.* 1778, p. 357; 1798.

But while the solar rays traverse the earth's atmosphere, they suffer another change from the resisting medium which they encounter. When the sun, or any of the heavenly bodies, are considerably elevated above the horizon, their light is transmitted to the earth without any perceptible change; but when these bodies are near the horizon, their light must pass through a long tract of air, and is considerably modified before it reaches the eye of the observer. The momentum of the red, or greatest refrangible rays, being greater than the momentum of the violet, or least refrangible rays, the former will force their way through the resisting medium, while the latter will be either reflected or absorbed. A white beam of light, therefore, will be deprived of a portion of its blue rays by its horizontal passage through the atmosphere, and the resulting colour will be either orange or red, according to the quantity of the least refrangible rays that have been stopt in their course. Hence the rich and brilliant hue with which nature is gilded by the setting sun; hence the glowing red which tinges the morning and evening clouds; and hence the sober purple of twilight which they assume when their ruddy glare is tempered by the reflected azure of the sky.

We have already seen, that the red rays penetrate through the atmosphere, while the blue rays, less able to surmount the resistance which they meet, are reflected or absorbed in their passage. It is to this cause that we must ascribe the colour of the sky, and the bright azure which tinges the mountains of the distant landscape. As we ascend in the atmosphere, the deepness of the blue tinge gradually dies away; and to the aeronaut who has soared above the denser strata, or to the traveller who has ascended the Alps or the Andes, the sky appears of a deep black, while the blue rays find a ready passage through the attenuated strata of the atmosphere. It is owing to the same cause that the diver, at the bottom of the sea, is surrounded with the red light which has pierced through the superincumbent fluid, and that the blue rays are reflected from the surface of the ocean. Were it not for the reflecting power of the air, and of the clouds which float in the lower regions of the atmosphere, we should be involved in total darkness by the setting of the sun, and by every cloud that passes over his disc. It is to the multiplied reflections which the light of the sun suffers in the atmosphere, that we are indebted for the light of day, when the earth is enveloped with impenetrable clouds. From the same cause arises the sober hue of the morning and evening twilight, which increases as we recede from the equator, till it blesses with perpetual day the inhabitants of the polar regions.

If the earth were at rest, and not influenced by any other body of the system, its own figure, and that of its atmosphere, would be exactly spherical. In consequence of the diurnal motion of the earth, however, the figure of its atmosphere must be sphe-

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roidal like itself. "All the atmospheric strata," says La Place, "should take after a time the rotatory motion, common to the body which they surround. For the friction of these strata against each other, and against the surface of the body, should accelerate the slowest motions, and retard the most rapid, till a perfect equality is established among them. In these changes, and generally in all those which the atmosphere undergoes, the sum of the products of the particles of the body, and of its atmosphere, multiplied respectively by the area which their radii vectores projected on the plane of the equator describe round their common centre of gravity, are always equal in equal times.

Supposing then, that by any cause whatever, the atmosphere should contract itself, or that a part should condense itself on the surface of the body, the rotatory motion of the body, and of its atmosphere, would be accelerated, because the radii vectores of the area, described by the particles of the primitive atmosphere becoming smaller, the sum of the product of all the particles, by the corresponding area, could not remain the same, unless the velocity of rotation augments.

At its surface the atmosphere is only retained by its weight, and the form of this surface is such, that the force which results from the centrifugal and attractive forces of the body, is perpendicular to it. The atmosphere is flattened towards the poles, and distended at its equator; but this ellipticity has limits, and in the case where it is the greatest, the proportion of the axis of the pole and the equator is as two to three.

The atmosphere can only extend itself at the equator, to that point where the centrifugal force exactly balances the force of gravity; for it is evident, that beyond this limit the fluid would dissipate itself. Relative to the sun, this point is distant from its centre by the length of the radius of the orbit of a planet, the period of whose revolution is equal to that of the sun's rotation.

The sun's atmosphere then does not extend so far as Mercury, and consequently does not produce the zodiacal light, which appears to extend even to the terrestrial orbit. Besides, this atmosphere, the axis of whose poles should be at least two-thirds of that of the equator, is very far from having the lenticular form which observation assigns to the zodiacal light.

The point where the centrifugal force balances gravity, is so much nearer to the body, in proportion as its rotatory motion is more rapid. Supposing that the atmosphere extends itself as far as this limit, and that afterwards it contracts and condenses itself from the effect of cold at the surface of the body, the rotatory motion would become more and more rapid, and the farthest limit of the atmosphere would approach continually to its centre: it will then abandon successively in the plane of its equator, fluid zones, which will continue to circulate round the body, because their centrifugal force is equal to their gravity. But this equality not existing relative to those particles of the atmosphere, distant from the equator, they will continue to adhere to it. It is probable that the rings of Saturn are similar zones, abandoned by its atmosphere.

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If other bodies circulate round that which has been considered, or if it circulates itself round another body, the limit of its atmosphere is that point where its centrifugal force, *plus* the attraction of the extraneous bodies, balances exactly its gravity. Thus the limit of the moon's atmosphere, is the point where the centrifugal force due to its rotatory motion, *plus* the attractive force of the earth, is in equilibrium with the attraction of this satellite. The mass of the moon being $\frac{1}{587}$ of that of the earth, this point is distant from the centre of the moon, about the ninth part of the distance from the moon to the earth. If, at this distance, the primitive atmosphere of the moon had not been deprived of its elasticity, it would have been carried towards the earth, which might have retained it. This is perhaps the cause why this atmosphere is so little perceptible."

Oscillations of the atmosphere.

The earth's atmosphere must experience similar oscillations to those of the ocean, from the action of the sun and moon. In an atmosphere, however, like ours, which is so much agitated by other causes, the winds and variations in the barometer, which, arising from the same cause, have the same periods as the tides, must be very inconsiderable. The change in the altitude of the mercury in the barometer is only about $\frac{1}{25}$ of an inch at the equator, where it is a maximum; though it is not improbable, that the oscillations of the atmosphere, like those of the ocean, may be increased by local circumstances. "If we consider all the causes," says La Place, "which disturb the equilibrium of the atmosphere; its great mobility arising from its fluidity and elasticity; the influence of heat and cold on its elasticity; the great mass of vapour that it alternately absorbs and deposes; and lastly, the changes which the rotation of the earth produces in the relative velocities of its particles, which for this reason are displaced in the direction of the meridians; we should not be surprised at the inconstancy and variety of its motions, which it would be very difficult to subject to any fixed and certain laws." See ANEMOMETER, ASTRONOMY, BAROMETER, CHEMISTRY, CLIMATE, METEOROLOGY, PNEUMATICS, and THERMOMETER. (*o*)

ATMOSPHERES of the Sun, Moon, and Planets. See ASTRONOMY.

ATMOSPHERES of Electrical Bodies. See ELECTRICITY.

ATMOSPHERICAL CLOCK, the name of a machine proposed by Dr Brewster for measuring the mean temperature of the atmosphere during any given interval. This machine records every variation of temperature that takes place during a given period, and the result indicated on the dial-plate is the exact average of all the heights of the mercury in the thermometer. The variations of heat and cold affect the pendulum, which may be either of the tubular or gridiron kind; and which is so constructed as to render sensible in the motion of the clock the alternate contractions and dilatations which it undergoes. This instrument shall be fully described in a subsequent part of the work. (*o*)

ATNAH, a tribe of Indians, who inhabit that part of the north-west of America, which lies in W. Long. 122°, and N. Lat. 52°. Their language, according to Mr Mackenzie, has no affinity with any other with which he was acquainted. See Mackenzie's *Journal of a Voyage through the North-West Continent of America*, p. 258. (*j*)

ATOMICAL PHILOSOPHY, that doctrine which professes to explain the origin of all things, by a combination of atoms.

The philosophers, who adopted this doctrine, may be divided into two classes; the theistical, and the atheistical. The first are those who adopted the ancient doctrine concerning atoms, said to have been first taught by Moschus the Phœnician, who, according to Strabo, lived before the Trojan war. This philosopher taught, that all bodies were composed of atoms, uniform in substance, impenetrable, indivisible, eternal; that the different forms and qualities of matter, arose solely from different combinations of these ultimate atoms; in the same manner as all the words of a language are formed by different combinations of the letters of the alphabet. The same body, for instance, becomes hard, or soft, or fluid, not from any alteration in its substance, but merely from a different arrangement of its constituent atoms. In this way they account for all the primary qualities of matter. And with regard to the secondary qualities, such as heat, cold, sweet, bitter, &c. as these are altogether distinct from the figure, situation, and motion of the insensible atoms, they held, that they must be nothing but sensations or passions excited in the mind, though they are commonly mistaken for qualities in bodies without us.

Now all this is not only perfectly harmless, but also very ingenious, with the exception of the eternity of atoms; an error, which it was not to be supposed that any of the ancient philosophers should avoid, who all maintained the eternity of matter in some form or other. With this exception, the doctrine is very little different from that which has been received and improved in modern times, under the name of the *Corpuscular Philosophy*. For Sir Isaac Newton affirms, that matter was at first created in solid, hard, impenetrable, moveable particles; and that out of these result the various forms and qualities of body. Indeed, no doctrine can be more consistent with pure theism, than that of the ancient atomists: for, whilst they denied to the atoms sensation and innate motion, (an error adopted by the later atomists,) there was an absolute necessity for some intelligent power to arrange them into form, so as to produce that order and regularity, which we perceive in the universe.

Some have attempted to give eclat to this philosophy, by making Moschus, the reputed author of it, the same as Moses. This, however, is very improbable. Moses, in his cosmogony, certainly teaches nothing concerning atoms; and there is no evidence nor probability, that he ever wrote or taught any thing on the subject beyond the concise and simple account contained in the Scriptures. It has even been doubted whether the doctrine is entitled to such high antiquity, as has been ascribed to it. And many have maintained, that it was first broached by Leucippus, Democritus, or Protagoras, many ages after the æra of Moschus. Such as wish to see this point cleared up, may consult Cudworth's *Intellectual System*, where the antiquity of the doctrine is ably maintained; and where it is traced with infinite learning, though with little method, through all its changes and ramifications, till it ended in absolute atheism.

We now proceed to consider the philosophy of the later atomists, which was decidedly atheistical. The author of this system is generally allowed to have been Leucippus, who is said to have been a disciple of Zeno the Eleatic philosopher, who flourished about the 84th Olympiad. According to Zeno, there is only one being, and that being is God. This appears, as far as it can be understood, to be nothing else than the Pantheistic doctrine, so commonly adopted by the ancient philosophers. But the pupil departed so far from the tenets of his master in this respect, that he introduced a system, which excluded the agency of Deity altogether, and professed to account for the production of all natural bodies from physical causes. All this is effected by giving to atoms an internal principle of motion, and making them dance together, till at last they produce a world. Observe then the steps, by which this important process is completed. "The universe, which is infinite, is in part a *plenum*, and in part a *vacuum*. The *plenum* contains innumerable corpuscles or atoms of various figures, which, falling into the *vacuum*, struck against each other; and hence arose a variety of curvilinear motions, which continued, till at length atoms of similar forms met together, and bodies were produced. The primary atoms being specifically of equal weight, and not being able, on account of their multitude, to move in circles, the smaller rose to the exterior parts of the *vacuum*, whilst the larger, entangling themselves, formed a spherical shell, which revolved about its centre, and which included within it all kinds of bodies. This central mass was gradually increased by a perpetual accession of particles from the surrounding shell, till at last the earth was formed. In the mean time, the spherical shell was continually supplied with new bodies, which in its revolution is gathered up from without. Of the particles thus collected in the spherical shell, some, in their combination, formed humid masses, which by their circular motion gradually became dry, and were at length ignited, and became stars. The sun was formed in the same manner, in the exterior surface of the shell; and the moon in its interior surface. In this manner the world was formed." Enfield's *Hist. of Phil.*

Democritus adopted the atomical doctrine as newmodelled by Leucippus; and, by the help of a little more ingenuity, extended its reputation, without correcting any of its absurdities. Both these philosophers had retained the gods in their systems, from a regard to their own safety, and in compliance with popular prejudices. But Protagoras, a little bolder, and a little honester, than his predecessors, hesitated not to speak freely on the subject, to deduce from the doctrine its legitimate consequences, and thus fairly to explode the gods from the universe. For this instance of his zeal, he was banished from Athens; and may claim the honour of being the protomartyr of atheism.

At length appeared Epicurus, who so far outdid the labours of all who had gone before him, in enlarging and enforcing the atomical doctrine, that his warm admirer Lucretius claims for him the honour of the whole invention. The poet appears particularly grateful for the emancipation of the human mind from the influence of religion, which was completely effected according to the system of his master :

> *Humana ante oculos fœdè cum vita jaceret*
> *In terris oppressâ gravi sub religione,*
> *Primum Graius homo mortales tollere contra*
> *Est oculos ausus.*

Epicurus adopted the doctrines of the ancient atomists, to explain the organization and qualities of bodies ; and in so far as he adheres to their principles, he advances many ingenious things in his speculations. But he deserts the paths of true science, and of sober thinking, when he attempts to account for the production of all things without the operation of an intelligent cause. According to him, atoms are the elements, from which all things are compounded, and into which they are ultimately resolved. Not only are they the materials, out of which bodies are made ; but that energy or principle of motion, which essentially belongs to them, is the sole agent in all the operations of nature. Having assumed this principle, he then proceeds to show, that all the changes in the figure and properties of bodies consist in local motion. Heat is the influx of certain small, round corpuscles, which insinuate themselves into the pores of bodies in continual succession, till by their perpetual action, the parts are separated, and at length the body dissolved. Cold is the influx of certain irregular atoms, whose motion is slower than those which occasion heat. Production and dissolution are nothing more than a change of the position of atoms, or an increase or diminution of the particles of which bodies are composed.

But the original formation of the world is the principal thing to be accounted for ; and this Epicurus, with most other cosmogonists, makes a very easy process. Accordingly he tells us, without any hesitation, and without the semblance of proof, that a finite number of atoms, tumbling through the *vacuum*, were, in consequence of their innate motion, collected into one indigested mass. A small difficulty, however, occurs here ; if these atoms fell perpendicularly, how did they ever happen to unite ? They could not overtake each other : for in a *vacuum* all bodies fall with equal velocity, whatever may be the difference of their specific gravity in other circumstances. The same objection holds, supposing them to fall obliquely : neither will it do to say that they fell tumultuously, in all different directions : because the principle of gravity, with which they are supposed to be endued, must act uniformly ; and if there be any deflection of the atoms from one regular course, it must proceed from some external cause, which is altogether contrary to Epicurus's system, which ascribes every thing to the energy and activity of atoms. These difficulties were not unobserved ; but they were easily obviated, so long as hypothesis could be substituted for argument. Accordingly an expedient was devised, to remove these objections : and it was asserted, that the atoms suffered a slight deflection in their course, at different times and different places, by which means they effected a junction. At the same time, this deflection was so small, as not to constitute obliquity ; for Lucretius loudly protests against such heresy as this, and declares it to be contrary to common sense, that bodies should descend by their own weight, in an oblique direction. Nevertheless, to answer his purpose, he is forced to assign to the atoms a declination from the perpendicular descent, whilst he denies that this declination can constitute oblique motion. They may understand this who can. This, however, is a favourite mode of solving difficulties with Epicurus. For, when talking of the form of the gods (another knotty subject) he maintains that they have *non corpus, sed quasi corpus ; non sanguinem, sed quasi sanguinem*, (Cic. de nat. Deor. l. i.) ; so with regard to the primordial atoms, he seems to say, that they have *non clinamen, sed quasi clinamen.* With respect to these mysteries, we can for once cordially adopt the sentiments of an Epicurean ; *hæc et inventa sunt acutius, et dicta subtilius ab Epicuro, quam ut quivis ea possit agnoscere.*

Passing over these few obstacles in the outset, let us suppose the atoms brought together, by whatever means, so as to form a chaos. Then, according to Epicurus, those atoms which were lightest, mounted up and formed the air, the heavens, and the stars ; whilst the more sluggish subsided, and formed the earth in which we live. Thus, these atoms are the handiest things in the world : at one time they descend necessarily, by the power of gravity, to form a chaos ; and they obey no less readily the necessity of the system-maker, and mount at the word of command to form the lights of heaven.

But it surely cannot be necessary to pursue this nonsense farther, nor to attempt a serious refutation of what carries in its face such glaring absurdity. The radical error of Epicurus, and of many others of the ancient philosophers, consisted in supposing motion to be essential to matter, and matter to be eternal. No fact in physical science is better ascertained, than the absolute *inertia* of matter, and its indifference as to motion or rest : and it is an axiom of natural philosophy, that matter will continue for ever in an uniform state of motion or rest, unless affected by external causes. Were motion essential to matter, we could not conceive matter to exist without it. Abstract from matter any of its general allowed properties, such as solidity, extension, divisibility, &c. and you destroy the idea of it altogether : for it is impossible to form a conception of substance without these qualities. But abstract motion from it, and your conception of it will be as complete as ever. It is expected the reader will distinguish between motion and mobility, the latter being one of the general properties of matter. And, with regard to the opinion that matter is eternal, though it was adopted by all the ancients, and also by some among the moderns, yet we have no hesitation in affirming, that it is equally ill-founded with that which we have been refuting. For if matter is eternal, then it is also self-existent, infinite, and immutable, and excludes the very possibility of Deity, which even an atheist would scarcely venture to affirm. It is evident, however, that there cannot be two different substances in existence, each of them eternal, self-existent, independent, and unchangeable. Whether then shall we acknowledge as the eternal principle, matter, which is motionless, inert, and incapable of acting with intelligence, or that spirit which we denominate God, and which can be demonstrated to be possessed of power, intelligence, and goodness? The question scarcely requires an answer. There can be only one eternal Being, and that Being is God, from whom matter receives its existence, motions, forms, and modifications. For a fuller demonstration of this subject, see Cudworth's *Intellect. Syst.* and the articles MATTER, METAPHYSICS, MOTION. (*g*)

ATONEMENT, in theology, means that sacrifice which Christ offered in his own person for the sins of men. This doctrine supposes the human race to be in a fallen state, and incapable of effecting its deliverance. There is evidently the strongest foundation in reason for this representation. It is perfectly obvious that all have sinned; and, if we may judge from the infinitely varied and inconsistent attempts of men, it appears no less certain that they were altogether incapable of devising any effectual method of expiating their sins. The austerities of the bigot, however, the self-inflicted torments of the enthusiast, and the sacrificial rites of all nations, show the general impression on the human mind, that some expiation was necessary. The whole tenor of the sacred scriptures leads to the same conclusion. The Supreme Lawgiver could not but exact perfect obedience to his laws, and denounce punishment against those who transgressed them: for laws cannot be enforced but by penal sanctions, and these sanctions can have no effect unless they are carried into execution. According to this view of the case, then, the whole human race must stand condemned by the pure and holy law of God, which they have so often violated. It is absurd to talk of the mercy of God interposing to save us from punishment, without any satisfaction to his justice: it would be the same as if a king were to enact wholesome laws for the security of his people, which his clemency prevented him from ever carrying into execution. Thus, then, the justice and holiness of God stood in the way of an unconditional pardon, and demanded that the purity of his nature should be vindicated, and the honour of his law asserted; he could not however have inflicted on man the punishment which his sins deserved, without involving the whole human race in one common ruin, as he formerly did with the generation before the flood. In order, then, that the sinner might be justified, and the honour of the divine law preserved inviolate, God sent his Son into the world, with his own free consent, that he might take away sin by the sacrifice of himself. For this purpose he assumed the human nature, that he might exhibit a perfect example of righteousness, and accommodate his instructions to our capacities; but chiefly that he might suffer and die for our offences.

The adversaries of this doctrine have endeavoured to bring it into discredit, by representing it as a-kin to the notions of the heathens, who conceived their gods to be cruel, and vindictive, and only to be appeased by the blood of innocent victims. No representation can be more contrary to the spirit of Scripture, which uniformly represents the Almighty as actuated by love, and not by vengeance, when he planned the great scheme of redemption. "God so loved the world, that he gave his only begotten Son, that whosoever believeth on him might not perish, but have everlasting life:" and to show that his displeasure was directed against the offence, rather than the offenders, he punished sin in the person of his own Son, "making him to be sin for us, though he knew no sin, that we might be the righteousness of God in him."

It has been disputed whether the divinity of Christ be essentially connected with the doctrine of his atonement. All the Arians maintain the negative side of the question: they admit the efficacy of the atonement, but deny the proper divinity of Christ. Some Trinitarians are of the same opinion, maintaining that the efficacy of the atonement arises from its being appointed by God, and not from the dignity of the sufferer. But if this were the case, we do not see why the blood of bulls and of rams might not have been equally meritorious, for they certainly were offered by divine appointment. Besides, there is an axiom equally applicable to physics, to morals, and to theology; *Frustra fit per plura, quod fieri potest per pauciora.* This axiom has been formed, from contemplating the works and dispensations of God; in which, whilst there is nothing defective, we never discover any thing superfluous, or redundant. Admitting, then, the divinity of Christ, we cannot well see how any one can deny it to be essentially connected with the efficacy of his atonement: for if a divine person has suffered, and that by God's appointment, we may conclude, from the general analogy of nature, that it is, not only proper it should be so, but that nothing less could have sufficed. This conclusion is also in perfect consistence with the usual sentiments of mankind on this subject, who have uniformly believed that sacrifices were efficacious, in proportion to their value. This sentiment, with certain qualifications, is strictly true; and we would therefore naturally conclude, that the sacrifice of the Son of God, as being most valuable in its nature, was, on that account, most effectual in its consequences for expiating the sins of men. The apostle, indeed, seems to decide this question, and to show that the prevailing efficacy of our High Priest depends on his supreme dignity; and that nothing less could have suited the wants of men. "Such a High Priest became us, who is holy, harmless, undefiled, separate from sinners, *and made higher than the heavens.*" Heb. vii. 26.

The further exposition of the doctrine of atonement, with the various opinions entertained respecting it, belongs more properly to the article THEOLOGY: we shall therefore content ourselves at present, with obviating some of the principal objections which have been urged against the general doctrine.

Deists, who reject the whole of revelation, reject of course the doctrine of atonement. In this they are at least consistent, which is more than can be said for the Socinians, who join them in this respect, whilst they pretend to reverence the scriptures as a revelation from heaven: their objections are the same, in so far as they pretend to draw them from reason: the Socinians have a separate contest to maintain, when they attempt to reconcile their opinions with the declarations of scripture. In the first place, it is a favourite argument with both, that no atonement is necessary, because repentance is sufficient to procure forgiveness: this they say is demonstrable on principles of reason; which we positively deny. Before the necessity of repentance was so strongly insisted on in the gospel, very little stress seems to have been laid on this quality; we will do the heathen moralists the justice to say, that they were, in general, men of too good sense to maintain this unreasonable and dangerous doctrine, that repentance was a sufficient reparation for offences. This would indeed have made sin sit very light on the conscience, when the perpetrator knew that a little sorrow would absolve him from guilt; and the argument drawn from such an opinion, would apply with equal force against the infliction of civil punishment, as against an atonement for crimes. The repentance of a criminal is never admitted by the laws of any country as a sufficient compensation for guilt; nor does the criminal himself regard it in this light; but whilst he expresses his sorrow for the offence, confesses at the same time the justice of his punishment. This favourite doctrine then of Deists and Socinians, as to the independent efficacy of repentance, seems to have no foundation, either in the practice or in the conscience of men. Nor does it receive any countenance from the general analogy of nature, or the usual course of the divine dispensations. Even in the ordinary affairs of life, when men neglect their duty, or give themselves up to intemperance, we frequently observe, that repentance, and reformation cannot save them from the natural consequences of their guilt or neglect; but the ruin of their affairs and the loss of their health follow as the punishment of their former misconduct. Thus, then, to use the words of Bishop Butler, "There is a certain bound to imprudence, and misbehaviour, which being transgressed, there remains no place for repentance in the natural course of things." If we then offend in our high capacity of rational and immortal beings, we have certainly no reason to expect that our repentance can of itself deliver us from that punishment which God has annexed as the natural consequence of our transgressions. Thus, then, though it is evident that repentance is necessary, yet it is no less evident that it is not of itself sufficient to procure forgiveness.

In the second place, the alleged absurdity of vicarious suffering, or the injustice of an innocent person's suffering for the guilty, is another point at which Deists and Socinians make a stand, to combat the doctrine of atonement. But if good is to be produced, where is the absurdity of an innocent person suffering? This objection comes with a bad grace from a Socinian, who admits that Christ suffered; and alleges it as the reason that we might be taught patience and resignation by his example. This is giving up the point at once, when it is admitted that Christ's sufferings were intended to teach us any useful lesson; for it is admitting that an innocent suffered for the benefit of the guilty. Indeed this is such a common occurrence, that to affirm it to be unjust, would be to arraign the whole economy of providence, and the whole moral government of God; for we daily see the innocent suffering for the sake of the guilty: and in many cases the laws of all nations admit of a substitution, as a sufficient compensation for violated justice. In a thousand instances, nature and reason demand that we should interpose, and mitigate the sufferings of the imprudent or unfortunate, by bearing a share of their calamities. This is so very evident, that Grotius, in his tract *De satisfactione Christi*, c. 4., observes, *Ubi consensus aliquis antecederet, ferme ausim dicere omnium eorum quos Paganos diximus, neminem fuisse, qui alium ob alterius delictum puniri injustum duceret.*

But modern Socinians, or, as they call themselves, Unitarians, (and, indeed, there is a wide difference between some of their opinions and those of Socinus, who certainly approached much nearer to the orthodox system than they do,) have had the boldness to affirm, that the doctrine of atonement is not once to be found in scripture. This is maintained by Priestley, in his answer to Paine, with a view to render Christianity palatable to that unbeliever, by explaining away its most peculiar and most obnoxious doctrines. "The doctrines of atonement, incarnation, and the Trinity," says he, "have no more foundation in the scriptures than the doctrines of transubstantiation or transmigration." This is new ground indeed: we know that the scriptures have often been rejected because they contained the doctrine of atonement, &c.; but it was reserved for Dr Priestley and his associates to discover, that such doctrines were not to be found there. Neither the friends nor the enemies of Christianity had ever suspected such a thing before; and it would have been almost as easy to have persuaded them that Homer did not write of Troy, as that the evangelists did not write of the atonement. It is not once hinted at in the gospels, say these writers; we would be obliged to them, then, for a satisfactory explanation of these expressions: "the Son of man came not to be ministered unto, but to minister, *and to give his life a ransom for many;*" Mark, x. 45. "This is my blood of the new testament which is shed for many, *for the remission of sins:*" And if we turn to the epistles, we can scarcely find a page where this doctrine is not either expressly taught or alluded to. If it is therefore to be reckoned among the corruptions of Christianity, as Dr Priestley affirms, we should be forced to conclude, that Christianity was corrupted by its founder, and that its first preachers exerted themselves to propagate a delusion. It is lamentable to see the judgment of a man, otherwise acute, so miserably warped by prejudice, as to be unable to discern the clearest truths. We shall see still farther reason for this observation, when we attend to the extraordinary position which he advances on another occasion: "From a full review of the religions of all ancient and modern nations, they appear to have been utterly destitute of any thing like a doctrine of proper atonement." Is it possible that such a sentiment should be seriously maintained by a divine, a scholar, and a historian,—a sentiment which any peasant might refute from the Jewish law, and any school-boy from the practice of ancient nations? What so common as expiatory sacrifices amongst all nations under heaven? and yet Dr Priestley could discover no vestiges of such a practice!

The death of Christ, according to Priestley and his followers, was intended to give us a proof of our resurrection and immortality, by his rising from the dead. But surely these doctrines were not so new, nor so uncommon, as to require such a proof: the doctrine of a resurrection was familiar to the Jews; and they had seen several actual proofs of its possibility: and the doctrine of the soul's immortality was received among all nations. Dr Priestley, indeed, who affirmed the soul to be nothing but a combination of matter, might reckon some extraordinary evidence necessary to prove its future existence: But the bulk of mankind did not deem such a proof necessary; for they had always believed in the soul's immortality. We do not deny that this doctrine, as well as many others connected with morality and religion, received the strongest confirmation by our Lord's instructions, death, and resurrection. But no one who receives the scriptures as the word of God, or indeed in any other sense, can fail to observe, that the great end of our Lord's death is uniformly stated to be, that he might make an atonement for the sins of men; nor can we see how his death, in any other view, should have at all been necessary; for all the other parts of his mission might have been completely accomplished without it. See Magee *On the Atonement*, and THEOLOGY. (*g*)

ATOOI, ATTOWA, ATTOWAY, or TOWI, one of the largest of the Sandwich Islands, situated in the Pacific Ocean, in one of the new divisions of the globe called Polynesia. According to some accounts, it is about thirty miles long from east to west, while others make it about 300 miles in circumference. On the east side, the island rises with a gentle acclivity from the sea, and terminates in high land near the centre of the island. The elevated grounds are clothed with lofty trees, with the most luxuriant foliage; but, on descending to the eastern coast, the land is uncultivated, and almost deserted by the inhabitants. On the western shore the ground is more fertile, and the population more numerous. The chief productions of the island are sweet potatoes, yams, sugar-cane, pepper, and a kind of oily nuts, which are stuck upon skewers, and used by the natives as candles. The island affords plenty of fresh water. The highest part of it is about 2430 yards from the level of the sea. Population 54,000. An account of the manners of the inhabitants, and other general observations, shall be given under the article SANDWICH ISLANDS. W. Long. 200° 20', or E. Long. 159° 40'; N. Lat. 21° 50'. See Marchand's *Voyage*, vol. ii. p. 80.; Cooke's *Voyages*, vol. iii.; Vancouver's *Voyages*, vol. i. p. 171. (*o*)

ATOPA, a genus of coleopterous insects in the arrangement of Fabricius and Cuvier, belonging to the family of *thoracicornes* of the latter. See ENTOMOLOGY. (*f*)

ATRACTYLIS, a genus of plants of the class Syngenesia, and order Polygamia Equalis. See BOTANY. (*w*)

ATRAGENE, a genus of plants of the class Polyandria, and order Polygynia. See BOTANY. (*w*)

ATRAPHAXES, a genus of plants of the class Hexandria, and order Digynia. See BOTANY. (*w*)

ATREBATES, or ATTREBATES, a tribe of the Belgæ, who inhabited that country now called Artois. Their capital, according to Scaliger, was Origiacum, now Arras. They were a fierce and barbarous people, who, like the Nervii, their neighbours, scarcely admitted foreigners among them, and valued themselves on their want of refinement. The Atrebates were enthusiastic in the cause of liberty against Cæsar, and entertained the utmost contempt for the other Gauls who had submitted to his arms. The quota of troops which they furnished to the Belgic confederacy was 15,000 men, whom we afterwards find as a distinct body engaging some of the Roman legions in a river. Upon the defeat and dissolution of the Nervian confederacy, Cæsar set over them, in quality of king, their own countryman, Comius the Atrebatian. This man, who was a crafty time-serving politician, was also an expert general, and held a distinguished command under Cæsar in most of his Gallic and British campaigns. He at last quarrelled with his master, in the hope of acquiring his independence, and received a desperate wound in an action, where he was left on the field for dead. Being at last forced into submission, he was pardoned in consideration of his past services; and, on delivering hostages, was allowed to continue in his authority.

There is some mention of a people of the same name in Britain. The capital of the British ATREBATES, or, as our antiquarians call them, ATTREBATII, is conjectured, from the name, to be the Calliva Attrebatum of Antonine's Itinerary, which seems to be the same with the Calcua of Ptolemy. This obscure tribe were probably a Belgic colony, who, like some other communities on the British coast, had arrived but a short time before Cæsar's invasion. This may be inferred from the influence which Comius the Atrebatian was supposed to possess, when sent by the Romans to persuade the Britons to a voluntary submission. Whatever may be in this, or whether the Atrebatian adventurers ever existed in Britain as a distinct nation or not, this people, it is certain, soon disappeared, and little or no notice is taken of the name by ancient writers. They are placed by some of the antiquaries in Berkshire, by others in Oxfordshire, and by others in part of both. Calliva is supposed to be the present Wallingford, in the county of Berks. See Cæs. *De Bell. Gall.* l. 2., et passim.; Camd. *Brit.*; Horsley's *Brit. Rom.*; Henry's *Hist. of Britain.* (E)

ATREUS, king of Mycenæ, the son of Pelops, and father of Agamemnon and Menelaus. The accounts of this prince that are preserved in ancient authors, will be found by consulting Plutarch *in Parall.*; *Pausan.* lib. 9. cap. 40.; Senec. *in Atr.*—*Apollod.* lib. 3. cap. 10.; Hygin. *Fab.* 83, 88, 258.; *Univers. Hist.* vol. vi. p. 162, 264. See also Lempriere's *Classical Dictionary*, Art. *Atreus.* (*w*)

ATRIPLEX, a genus of plants of the class Polygamia, and order Monœcia. See BOTANY. (*w*)

ATROPIA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

ATROPHY, (from ἀ, and τρεφω, *to nourish*,) is a wasting of the body, from defect of nourishment. See Medicine. (*j*)

ATTACHMENT (from the corrupt Lat. *attachiare;* Fr. *attacher*, to tie or fasten), in the common law of England, signifies the taking or apprehending a person or thing, by a writ or precept issuing on commandment of a court.

Attachment differs from arrest: for in arrest, the person apprehended is carried before a person of higher authority, to be disposed of; whereas, he who attaches another, keeps and presents him in court on the day assigned, according to the terms of the writ: *præcipimus tibi quod attachias talem, et habeas eum coram nobis*, &c. There is also this other difference between an arrest and an attachment: the former is made only upon the body of a man; the latter frequently upon his goods.

Attachment is also a mode of punishing contempts, immemorially used by the superior courts of justice. Contempts, thus punishable, are either *direct* or *consequential*. The following are the principal instances of either kind: 1. Those committed by inferior judges and magistrates, by acting unjustly, oppressively, or irregularly, in the administration of justice; or by disobeying the king's writs issuing out of the superior courts. 2. Those committed by sheriffs, bailiffs, gaolers, and other officers of the court, by abusing the process of the law, or deceiving the parties, by acts of oppression, extortion, collusion, or culpable neglect of duty. 3. Those committed by attornies and solicitors, who are also officers of the respective courts, by any species of dishonest practice. 4. Those committed by jurymen, in collateral matters relating to the discharge of their office; such as making default when summoned, refusing to be sworn, or to give any verdict; eating and drinking without the leave of the court, &c. but not in the mere exercise of their judicial powers; as by giving a false or erroneous verdict. 5. Those committed by witnesses, by making default when summoned, refusing to be sworn or examined, or prevaricating in their evidence when sworn. 6. Those committed by the parties to any suit; as by disobeying any rule or order made in the progress of a cause, by nonpayment of costs awarded by the court, or by nonobservance of awards duly made by arbitrators or umpires. 7. Those committed by any other persons, under the degree of a peer, and even by peers themselves, when enormous and accompanied with violence, such as forcible rescuos and the like; or when they import a disobedience to the king's great prerogative writs, of prohibition, *habeas corpus*, &c.

The process of attachment for these and the like contempts must necessarily be as ancient as the laws themselves: for it is obvious, that all laws would be vain and nugatory, without a competent authority vested in the courts, to secure their administration from disobedience and contempt. Accordingly we find this process in use, as early as the annals of our law extend.

Should the contempt be committed in the face of the court, the offender may be instantly apprehended and imprisoned, at the discretion of the judges, without any further proof or examination. But in the case of contempts arising out of court, if the judges upon *affidavit* see sufficient grounds for suspecting that a contempt has been committed, they either make a rule on the suspected party, to shew cause why an attachment should not issue against him; or, where the contempt has been very flagrant, the attachment issues in the first instance; as it does also, if no sufficient cause be shewn to discharge, and thereupon the court confirms and makes absolute the original rule.

Attachment.

The attachment is merely intended for bringing the offender into court. Thereafter, he either stands committed, or puts in bail, and is interrogated upon oath with respect to the circumstances of the contempt. The interrogatories must be exhibited within the first four days. If the party clears himself, he is discharged; but, if perjured, he may be prosecuted for the perjury. The mode of punishing contempts is by an arbitrary punishment, at the discretion of the court, according to the nature and magnitude of the offence.

Attachment is used in Chancery, if the defendant, on service of the *subpœna*, fails to appear within the time limited by the rules of the court. It is a writ of the nature of a *capias*, directed to the sheriff, and commanding him to attach the defendant, and bring him into court. If the sheriff returns *non est inventus*, then there issues an *attachment with proclamations;* which directs the sheriff to make public proclamations to summon the defendant, upon his allegiance, personally to appear and answer. If the defendant still persists in contempt, a *commission of rebellion* is awarded against him, and four commissioners are named, any one of whom is to attach him wheresoever he may be found in Great Britain, as a rebel and contemner of the king's laws and government. If a *non est inventus* is returned upon this commission of rebellion, the court then sends a *serjeant at arms* in quest of him; and if he still eludes the search, a *sequestration* issues to seize all his personal estate, and the profits of his real, to be detained, subject to the order of the court. After the issuing of an order for sequestration, the plaintiff's bill is to be taken *pro confesso*, and a decree made accordingly; the sequestration being only intended to enforce performance of the decree.

If the defendant is taken up upon any of this process, he is to be committed to the Fleet, or other prison, until he appears, or answers, or performs whatever else this process is issued to enforce, and also clears his contempts, by paying the costs incurred by the plaintiff.

A *writ of attachment*, or *pone* (so called from the words of the writ, *pone per vadium et salvos plegios*, &c.) is a writ, not issuing out of Chancery, but out of the court of Common Pleas, founded on the nonappearance of the defendant at the return of the original writ; whereby the sheriff is commanded to attach him by taking *gage*, that is certain of his goods, which shall be forfeited if he does not appear; or by making him find safe pledges, or sureties, for his appearance. This process is also used, without any previous summons, upon actions of trespass *vi et armis*, or other injuries importing a breach of the peace, as *deceit* and *conspiracy*.

In case the defendant neglects to appear, the attachment is followed up by a writ of *distringas*, or *distress infinite;* and, in certain cases, a *capias* issues against the defendant's person. See Distress and Capias.

Foreign attachment, is an attachment of the goods of foreigners, found within some liberty, for the satisfaction of their creditors residing within such liberty.

By the custom of some places, as London, &c. a man may attach money or goods in the hands of a stranger. But no foreign attachment can be had, while a suit is depending in any of the courts at Westminster. And no attachment can be had, but for a certain and due debt; although, by the custom of London, money may be attached before the term of payment, but not levied until due.

Foreign attachments in London, upon plaints of debt, are made in the following manner: A. owes B. £100; and C. is debtor to A. in the like sum. B. enters an action against A. for £100; and by virtue of that action, a serjeant attaches £100 in the hands of C. as the money of A. to the use of B. which is returned upon that action.

After the attachment has been made and returned by the serjeant, the plaintiff must fee an attorney, before the next court holden for the Compter; or the defendant may then put in bail to the attachment, and non-suit the plaintiff. Four court-days must elapse, before the plaintiff can call upon C. the *garnishee*, to shew cause why B. should not condemn the £100 attached in the hands of C. as the money of A. the defendant. And the garnishee may appear by his attorney, and plead that he hath no money of the defendant's in his hands, or other special matter. But the plaintiff may hinder his waging of law, by producing two sufficient citizens to swear that the garnishee had either money or goods belonging to A. in his hands, at the time of the attachment; of which *affidavit* must be made before the Lord Mayor, and when filed, may be pleaded by way of *estoppel*.

If the garnishee neglects to appear by his attorney, after being warned by the officer, he is taken by default, for want of appearing, and judgment given against him; for which he has no remedy either at common law or in equity. But if the garnishee does appear and plead, the matter will then be tried by a jury, and judgment awarded, &c.

After trial, bail may still be put in, whereby the attachment shall be dissolved; but the garnishee and his security shall then be liable for whatever sum the plaintiff shall make out to be due upon the action. An attachment is never thoroughly perfected, until there is a bail and satisfaction upon record.

Attachment of privilege, is where a person, by virtue of his privilege, calls another into that court to which he himself belongs, there to answer some action. Or, it signifies the power of attaching a man in a place privileged.

Corporation-courts have sometimes the privilege, by charter, of issuing attachments; and some baron-courts issue attachments of debt.

Attachments, court of, Wood-mote, or forty-day's court, is one of the *forest-courts*, instituted for the purpose of enquiring into all offenders against vert and venison. See Courts *of Forest*. Blackst. *Comment*. Jacob's *Law Dict*. (z)

ATTACK. See Military Tactics.

ATTAINDER, in law, is the immediate and inseparable consequence of a sentence of death. When this highest judgment known in the laws of England is pronounced, a mark of infamy is thereby set upon the criminal; he is thenceforth put out of the protection of the law, which now takes no farther notice of him, than merely to see him executed. He is then said to be attaint, (*attinctus*, stained or blackened).

There is a wide difference between conviction and attainder. A man is convicted, when he is found guilty by verdict, or confession, before judgment had: but there is still, in the contemplation of the law, a possibility of his innocence. Something may be offered in arrest of judgment; the indictment may be erroneous; he may obtain a pardon, or be allowed the benefit of clergy; both of which plead in extenuation of his offence. But upon judgment given, both law and fact conspire to prove him completely guilty; and there is no longer a possibility of any thing being said in his favour.

A person may be attainted on appearance, or by process. Attainder on appearance is by confession, or verdict, &c. Attainder by process is when a criminal flies, and cannot be found; when after being five times proclaimed in the county, he is at length outlawed upon this default.

A person may likewise be attainted by act of parliament. *Acts of attainder* have been passed in several reigns, since the attainder of persons guilty of the murder of Charles I. in the reign of Charles II., down to the present times. In passing bills of attainder no evidence is required.

Attainders may be reversed or falsified by writ of error, or by plea. In the former case, it must be by the king's leave: in the latter, by denying the treason, pleading a pardon by act of parliament, &c.

The consequences of attainder are Forfeiture, and Corruption *of Blood*. See Blackst. *Comment*. b. iv. ch. 29. Jacob's *Law Dict*. (z)

ATTAINT, Writ of, is a writ which lies to enquire, whether a jury of twelve men have given a false verdict, in any court of record; in order that the judgment following upon that verdict may be reversed. It is so called, because the party who obtains it, thereby endeavours to stain or *taint* the credit of the jury, in consequence of whose verdict he feels himself aggrieved. This writ must be sued out in the lifetime of him in whose favour the verdict was given, and of, at least, two of the jurors who gave it.

At common law, this writ originally lay only upon verdicts in actions for such *personal* injuries as did not amount to trespass; because, in *real* wrongs, the party aggrieved had redress by *writ of right*. And it did not lie in the action of trespass, for this singular reason: that if the verdict were set aside, the king would lose his fine. But by stat. Westm. 1. 3 Edw. I. c. 38, it was given in all pleas of land, franchise, or freehold; and by several subsequent statutes, in the reign of Edward III. and his grandson, it was allowed in almost every action, except in a writ of right.

Twenty-four jurors are required to try this false verdict; who are called the *grand jury*. He that brings the attaint can give no other evidence to the grand jury, than what was originally given to the petit; because the question is solely, whether the petit jury did right upon the evidence brought before them? But those against whom the attaint is brought are allowed to bring new matter, in affirmance of the first verdict; because the petit jury may have formed their verdict upon evidence of their own knowledge, which never appeared in court; and because the judgment inflicted upon them, at common law, if their verdict was found to be false, was peculiarly severe. This judgment was: That they should lose their *liberam legem*, and become for ever infamous; that they should forfeit all their goods and chattels; that their lands and tenements should be seised into the king's hands; that their wives and children should be turned out of doors; that their houses should be rased and thrown down; that their trees should be rooted up; that their meadows should be ploughed; that their bodies should be cast into gaol; that the party should be restored to all that he had lost in consequence of the unjust verdict. The severity of this judgment, however, was mitigated by the statute 11 Hen. VII. c. 24. revived by 23 Hen. VIII. c. 3. which inflicted a more moderate punishment upon attainted jurors; viz. perpetual infamy, and, if the cause of action were above £40 value, a forfeiture of £20 each by the jurors; or, if under £40, £5 each; to be divided between the king and the injured party. So that an attaint may now be brought, either upon the statute, or at common law. But the practice of setting aside verdicts upon motion, and granting *new trials*, has now superseded the use of both sorts of attaints. See Blackst. *Comment.* b. iii. ch. 25. Jacob's *Law Dict.* (*z*)

ATTALUS, the name of several kings of Pergamus. See *Univers. Hist.* vol. vii. p. 263, 327, 382; viii. 189; x. 20, 40, (M); xii. 408; and *History of Free Masonry*, Edinburgh, 1804, p. 29. (*j*)

ATTELABUS, a genus of coleopterous insects, belonging to the family *Rostricornes* of the French naturalists. See ENTOMOLOGY. (*f*)

ATTENDANT KEYS, in music, are, according to Drs Boyce and Calcott, the keys on the fifth above, and fifth below, (or fourth above) any given key which in modulation are introduced, by the addition of a new sharp or flat to the signature. Mr Maxwell, p. 267. of his "Essay on Tune," proposes a system of 18 notes in the octave, which shall make the keys of C major and A minor, with their attendant keys, or 6 auxiliary scales, perfect in their harmony throughout. See Maxwell's *Scales of Music*, and AUXILIARY *Scales*. (*c*)

ATTENTION, a steady exertion or due application of the mind to any object of sense or intellect, in order to its being thoroughly understood, and afterwards retained. In its etymology it denotes *stretching* or *straining*, from *ad* and *tendo*, which not inaptly expresses that strong and undivided effort of our powers which is required for giving to an interesting object its due impression.

Whether attention be a distinct and independent power of the mind, which cannot be resolved into any thing else; or whether it consist merely in a steady and strenuous exercise of any one of our various mental powers, or organs of external perception, according as the case may require, are questions on which philosophers have differed considerably in opinion. All, however, have agreed, that this species of mental exertion is indispensible, in order that objects may affect our faculties to such a degree as to be afterwards retained in the mind, or distinctly recollected. "Memory," says Mr Locke, "depends much on attention and repetition." *C'est l'attention*, says Helvetius, *plus ou moins grande, qui grave plus ou moins profondément les objets dans la memoire.* And Quinctilian makes a similar observation. *Nec dubium est*, says he, speaking of memory, *quin plurimum in hac parte, valeat mentis intentio, et velut acies luminum a prospectu rerum quas intuetur non aversa.* These remarks seem to imply, that attention is voluntary on our parts; and so it doubtless is to a certain extent; but when we are occupied by a very interesting object, our attention is seized, and fixed beyond our own controul.

In those cases where our attention is entirely engrossed by something that greatly interests the mind, the impressions on the organs of sense seem to produce no corresponding effect on our internal powers of perception. A clock, for example, may strike in the room where we are, and if we be deeply engaged in conversation, or in any interesting speculation, we shall not be able, the next moment, to recollect whether we heard it or not. The most acute sensation of pain may pass unnoticed, if the attention be vigorously directed to another object. In the tumult of a battle, a man may be shot through the body without knowing any thing of the matter, till he discovers it by the loss of blood or of strength. And Archimedes, while intent upon the solution of a problem, was altogether unconscious of the sacking of Syracuse. In such cases we are apt to conclude, that the objects which act upon our senses, have lost their influence upon our perceptive powers; though the truth rather seems to be, that perception still takes place, but that we are unconscious of it, because our attention is completely engrossed by some other object. That this is really the case, seems proved by a variety of facts. Thus a person who falls asleep in church, and is suddenly awaked, is unable to recollect the last words of the preacher; and yet that they affected his perceptive powers appears from this, that he would have instantly awaked, had the preacher made a sudden pause in his discourse.

It seems, therefore, to be essential to memory, even in the very lowest degree, that the perception or thought which we wish to remember, should remain in the mind for a certain space of time, and should be contemplated by it exclusively of every thing else; otherwise it will not be recollected even the very moment after it has been present in the mind. Hence it happens that, in solitude, or the stillness of the night, when the attention is undistracted by surrounding objects, the impression made by any single object is very strong and deep, and the memory becomes extremely retentive; and hence, in the hurry of business, and bustle of society, the objects which press upon us in rapid succession, make but a fleeting impression upon the mind, and efface each other from our recollection.

It is an important question in the subject of attention, whether we have the power of attending to more than one thing at the same instant; or, in other words, whether we can attend at one and the same instant to objects which we can attend to separately. This question has usually been decided in the negative; it being supposed to be impossible that the mind can bend its thoughts upon more than one thing at the same time. It is a consequence of this doctrine, that in a concert of music, instead of attending to the different parts of the performance all at once, so as to feel the full effect of the harmony; the mind must constantly vary its attention from one part of the music to another, although its operations are so rapid as to give us no perception of an interval of time. "The same doctrine," says Mr Stewart, "leads to some curious conclusions with respect to vision. Suppose the eye to be fixed in a particular position, and the picture of an object to be painted on the retina; Does the mind perceive the complete figure of the object at once, or is this perception the result of the various perceptions we have of the different points in the outline? With respect to this question, the principles already stated lead me to conclude, that the mind does at one and the same time perceive every point in the outline of the object, (provided the whole of it be painted on the retina at the same instant,) for perception, like consciousness, is an involuntary operation. As no two points, however, of the outline are in the same direction, every point by itself constitutes just as distinct an object of attention to the mind, as if it were separated by an interval of empty space from all the rest. If the doctrine, therefore, formerly stated be just, it is impossible for the mind to attend to more than one of these points at once; and as the perception of the figure of the object, implies a knowledge of the relative situation of the different points with respect to each other, we must conclude, that the perception of figure by the eye, is the result of a number of different acts of attention. These acts of attention, however, are performed with such rapidity, that the effect, with respect to us, is the same as if perception were instantaneous.

"In farther confirmation of this reasoning, it may be remarked, that if the perception of visible figure were an immediate consequence of the picture on the retina, we should have at the first glance as distinct an idea of a figure of a thousand sides, as of a triangle or a square. The truth is, that when the figure is very simple, the process of the mind is so rapid, that the perception seems to be instantaneous; but when the sides are multiplied beyond a certain number, the interval of time necessary for these different acts of attention becomes perceptible. It may perhaps be asked, what I mean by a *point* in the outline of a figure, and what it is that constitutes this point *one* object of attention? The answer, I apprehend, is, that this point is the *minimum visibile*. If the point be less, we cannot perceive it: if it be greater, it is not at all seen in one direction." *Elements of the Philosophy of the Human Mind*, c. 2.

This doctrine, however, that the mind is incapable of attending to more than a single object, at one and the same instant of time, has been controverted by various able philosophers, who conceive it to be founded on a false analogy supposed to exist between the properties of body and those of mind. Material space, it is well known, must be completely occupied by a single body, to the exclusion of every other from that portion of it which the body fills; but what reason have we to ascribe such a quality as this to mind? Where is the analogy between the understanding and external space; or between a mere notion of the intellect, and an impenetrable piece of matter? On the contrary, there seems a kind of necessity, in certain cases, for admitting that the mind can attend at the same moment to objects which may also be made separate objects of attention, otherwise it does not appear how the relations and points of comparison between those objects can be satisfactorily understood. How, for example, can we discern the harmony between two musical notes, unless both are present to the mind together? Or how can we draw a conclusion from a comparison of two or more connected truths, unless we contemplate these truths in the mind at one and the same moment? Every syllogism is formed, by comparing together two propositions, called the major and the minor; and it seems necessary, before we can form a legitimate inference, that these two propositions should, at the same instant, be objects of our attention.

"Many single words," says Dr Gregory, "for example prepositions, and most sentences, denote some kind of relation; but we cannot, I think, conceive a relation, without thinking at once of the things (two or more) that are related, as well as of the relation (both in its generic and in its specific nature) that subsists between them." This author is of opinion, that, with respect to the moods and other inflections of verbs, there cannot be a doubt that they are employed to denote combinations of *simultaneous* thoughts, no one of which can reasonably be said to occur to the person speaking, or to be apprehended by the person hearing, before the rest: and that all nouns, even proper names, denote a congeries of circumstances, or *mass* (not a *train*) of thoughts, which are conceived at once, and cannot be separated and considered in succession, but by a very laborious effort. See *Theory of the Moods of Verbs*, *Edin. Phil. Trans.* vol. ii.

Various remarkable examples are upon record of the great power of undivided attention possessed by certain individuals, and of the capacity of apparently attending at the same moment to more than one important and interesting concern. Fontenelle relates of the celebrated mathematician Montmort, that he could command his attention at pleasure, insomuch, that in the same chamber where he was at work on the most complicated problems, his children might be as noisy as they pleased, or might dance and play upon the harpsichord. The famous chess-player Philidor, it is well known, could direct three games of chess at the same instant, of one of which only he required ocular inspection, the moves of the other two being merely announced to him by an assistant. And it is recorded of Julius Cæsar, that while he was writing a dispatch, he could at the same moment dictate four others to his secretaries: if he did not write himself, he could dictate seven letters at once. See Stewart's *Phil. of the Mind*, c. 2. Helvetius *De l'Esprit*. Condillac *Sur l'Origine des Connoiss. Hum.* s. 2. c. 1. Reid's *Intell. and Active Powers*. (*m*)

ATTENUANTS, or ATTENUATING MEDICINES, are those which are supposed to diminish the consistence of the blood, or secreted fluids. See MEDICINE. (*j*)

ATTERBURY, FRANCIS, was the son of Dr Lewis Atterbury, rector of Milton, in Buckinghamshire, and was born there in 1662. He was educated at Westminster school, and in 1680 became a student in Christ-church College, Oxford, where, in 1684, he took the degree of Bachelor, and in 1687 that of Master of Arts. In 1690 he married a lady of the name of Osborn, and about the same time entered into holy orders. He went to London in 1693, where he was elected preacher at Bridewell, and lecturer at St Bride's Church. Soon after this he was appointed one of the chaplains in ordinary to King William and Queen Mary, and in 1700 he was installed archdeacon of Totness. Upon the accession of Queen Anne, in 1702, he became one of her majesty's chaplain's in ordinary; in 1704 he was advanced to the deanery of Carlisle; in 1707 he was appointed one of the canons residentiary at Exeter; and in 1709 he was made preacher at Roll's chapel. In 1710 he was chosen prolocutor of the lower house of convocation; in 1712 he was made dean of Christchurch; and in 1713, at the recommendation of the Earl of Oxford, he was promoted to the bishopric of Rochester, and deanery of Westminster.

This rapid succession of promotions seems only to have kindled Atterbury's ambition for still higher exaltation. It is said that he aspired to the primacy of all England, and that he had taken such measures as would in all probability have secured it upon a vacancy, had not the queen's death, in 1714, prevented all his plans, and put an end to his prosperity. He soon found that he was not held in the same estimation by her successor George the First, and he himself soon began to manifest his disaffection to the reigning family. At a time when every man who held such a station as Bishop Atterbury, and who was not hostile to government, would naturally have felt himself called upon to express his decided disapprobation of the plans of the house of Stuart, he refused to sign a declaration which the bishops had published against the proceedings of the pretender; and he strengthened all the unfavourable impressions of this refusal, by keenly opposing the measures of the court. At length, in 1722, he was apprehended upon a suspicion of being engaged in a conspiracy to restore the Stuart family. His papers were seized, and he was committed to the Tower. A bill was soon after brought into the House of Commons, "for inflicting certain pains and penalties on Francis, Lord Bishop of Rochester;" but he reserved his defence till it should be argued in the House of Lords. There the bill met with much opposition, and engaged the attention of the House for more than a week. The bishop spoke in his own defence with great ability and eloquence, and concluded with a solemn protestation of his innocence. But the bill was at length passed, by a majority of 83 to 43, and Atterbury was condemned to perpetual exile. The king, it is said, when he confirmed the bill, expressed his regret that there should be just cause for inflicting such a punishment upon a bishop of the Church of England, and a man of such eminent abilities and attainments. His daughter, Mrs Morrice, was permitted to accompany him; and, by the king's sign manual, his son-in-law, Mr Morrice, had leave to correspond with him. He left England in June 1723, and landed at Calais, whence he went to Brussels, and thence to Paris. There he resided, for the most part, until his death, which took place on February 15, 1731, and which was supposed to be hastened by the loss of his daughter, two years before. His body was brought over to England, and interred in Westminster Abbey.

The literary productions of Bishop Atterbury were not very voluminous, but were considerable in point of number and variety. While a student at Oxford, he was distinguished for his taste in polite literature. During that period, he wrote a version, in Latin verse, of Dryden's Absalom and Ahitophel, an Epigram on a Lady's Fan, and a Translation of two Odes of Horace. His translations from Horace are considered as the best that have been made from that poet into the English language; and though their merit has perhaps been rated rather high, yet they certainly possess much of the lively spirit and graceful expression which characterise the original. From these indications of a poetical talent, which he gave in the early part of his life, many have concluded, that he was peculiarly qualified for that species of writing, and have lamented that he did not continue to cultivate his powers as a poet.* His next production was of a very different complexion, and, instead of trifling with the muses, he appears defending Luther and the reformation with great acuteness and learning. He referred to this publication at his trial, as an evidence that he had no secret inclination to Popery; and, on account of this performance, Bishop Burnet ranks him among the most eminent defenders of the protestant cause. He is supposed to have assisted the Honourable Mr Boyle, (afterwards Earl of Orrery,) who was under his tuition at Oxford, in the celebrated controversy which that nobleman carried on with Bentley, respecting the authenticity of the epistles of Phalaris. But the most extensive literary contest in which he engaged was with Dr Wake, (afterwards archbishop of Canterbury,) concerning the rights of convocations. Dr Wake supported the following positions: "1st, That the right of calling the clergy together in synods is vested solely in the prince; 2dly, That the clergy, so assembled, have no right to debate or determine any point of doctrine or discipline without his permission; 3dly, That the prince may annul, alter, or suspend, the execution of any of their constitutions or decrees; and lastly, that no synod can dissolve itself without consent of the prince." Atterbury opposed these principles, and asserted the right of the clergy to meet and deliberate without any licence or qualification. Several pamphlets were written on both sides by different persons; but Bishop Atterbury was the most active and able advocate of the high church principles and party. In this, as in all his controversial writings, he expressed himself in very intemperate language, and frequently (if we may believe Bishop Burnet) with no very strict adherence to truth.[*] He received, however, the thanks of the lower house of convocation, for his zeal in asserting the rights of the clergy, and was complimented by the university of Oxford with the degree of doctor in divinity. He had been appointed by the convocation one of the committee for comparing Mr Whiston's doctrines with those of the Church of England; and, in consequence of this appointment, he was principally concerned in drawing up "a representation of the present state of religion." In this performance, which Bishop Burnet calls "a virulent declamation," he contrives to throw the blame of the national wickedness upon those who had lately been in power, and even seeks occasion to accuse all the administrations since the Revolution. Before his death, he published a vindication of himself, Bishop Smallridge, and Dr Aldrich, from a charge of having altered and interpolated Lord Clarendon's History of the Rebellion. While he resided in France, he corresponded with many literary characters, and particularly with a M. Thiriot, who has published several of the bishop's letters, which consist chiefly of criticisms on several French authors. His letters to Mr Pope also are preserved, along with the letters of that poet; and it is in this correspondence that his character appeared in the most engaging point of view. The letters of Atterbury are accounted superior to those of Pope, in ease and elegance of expression; but the sentiments expressed in them are very irreconcileable with that restless ambition by which he seems to have been actuated in almost every period of his life. The Sermons of Bishop Atterbury may be considered as his principal work, and as having laid the foundation of his character as a writer. They are now extant in four volumes octavo; of which the two first volumes were published by himself, and the two last by his chaplain Dr Moore. The sermons, however, which Dr Moore has published, were marked by the bishop's own hand as the only ones fit to be printed; and all the rest which he had written were committed to the flames, partly by himself, and partly by his executors. Several of his sermons were severely attacked by Mr Hoadly; and he had a dispute with the same writer on the subject of passive obedience. In the course of that controversy, Hoadly clearly shewed, that Atterbury contradicted the sentiments which he himself had advanced when supporting the rights of convocation. In the sermons also, which Hoadly censured, there are several very unguarded positions and unscriptural tenets. Notwithstanding these defects, his appearance in the pulpit seem to have gained him many admirers, and have even been considered as the principal cause of his preferments. Though there is much reason to doubt this, yet it is undeniable, that they are among the best pulpit compositions of that age, and they still maintain a very respectable character in the opinion of all candid and judicious persons.[†] They scarcely, however, deserve the high praise which has been given them, for clear and convincing argument; but, like all the writings of Atterbury, they are more remarkable for correctness and ease than for strength and elegance of language; for clear and concise illustration, than for forcible reasoning and animated eloquence.

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* As a specimen of Bishop Atterbury's compositions in poetry, may be given his Epigram on a Lady's Fan, which was addressed to the lady who afterwards became his wife.

Flavia the least and slightest toy
Can with resistless art employ.
This fan, in meaner hands, would prove
An engine of small force in love;
Yet she, with graceful air and mien,
Not to be told, or safely seen,
Directs its wanton motions so,
That it wounds more than Cupid's bow:
Gives coolness to the matchless dame,
To every other breast a flame.

Upon examining the literary compositions of Bishop Atterbury, there appears, at one glance, the most abundant reason to acknowledge his great abilities, taste, and learning; but, upon a review of the history of his life, it is not easy to find equally striking indications of an upright moral and political character. While contemplating him in this view, it is no doubt necessary to keep in mind the turbulence of the times in which he lived, and the political contentions in which he had so great a share. It may easily be conceived, that, in such a scene, his activity and zeal, in whatever cause he espoused, would draw from his friends more frequent and pointed eulogies than he really deserved, as well as excite in his opponents stronger prejudices, and keener reproaches, than strict justice authorised. But, after making all reasonable allowances for the partialities of party, and following the fairest medium of judgment, it is not easy to form a very favourable estimate. It is known, that, in open defiance of all propriety and principle as a clerical character, he was accustomed to swear upon any strong provocation; that he was even amongst the foremost and keenest in every political contest which occurred in his time; that, in the different stages through which he passed in the course of his church preferments, he was involved in quarrels; and that Dr Smalridge, who succeeded him in two of the stations which he had filled, complained of his hard fate, in being obliged "to carry water after him, to extinguish the flame which his litigiousness had every where occasioned." From merely attending, then, to the acknowledged tenor and transactions of Bishop Atterbury's life, it appears too evident, that he was a man of a hot temper, and haughty spirit; ambitious of preferment, and jealous of his rights; violent in his public proceedings, and ready for political contention; cautious and cunning in general, yet frequently prompted by passion to expose his own reputation, and to injure his most favourite cause. There is no good ground for suspecting, that he was either inclined to infidelity,* or even favourable to Popery; but, besides the evidence advanced on his trial, there are several uncontroverted facts, which clearly indicate his attachment to the Stuart family, and which strongly tend to confirm the charge of his having been engaged in treasonable practices for their restoration.† But however much his personal concern in such plots may be doubted, and his disaffection to the reigning family excused, yet there is no adequate apology which can be made for the turbulence of his public proceedings, and no sufficient substitute to be found among all his excellencies and attainments, for that humility and meekness, that love of peace and of good order, which became him as a Christian bishop, but in which he was so extremely deficient. Even they who approve his principles as a high churchman, or who sympathise with his feelings as a friend of the Pretender, will not be able to vindicate the means which he used, and the spirit which he displayed, in supporting what, perhaps, he sincerely considered as just and right. He may claim our admiration for his natural endowments and acquired accomplishments: he may stand high in our opinion as an acute politician and an active partisan: and he may be contemplated with approbation in his intercourse with his family and friends; but his title is not so valid to that true greatness which consists in self government, integrity, and candour; nor can he even be admitted to have possessed any great share of that moral worth, which can attach to any man only by supporting consistently that character which he assumes, and by discharging consistently those duties which belong to him in his particular place and station. See Stackhouse's *Memoirs of Dr F. Atterbury;* and *Biograph. Britannica.* (*q*)

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[*] "Some books," says the bishop, "were wrote to justify it, (the complaint of the high church party, of the want of convocation,) with great acrimony of style, and a strain of insolence that was peculiar to one Atterbury, who had indeed very good parts, great learning, and was an excellent preacher, and had many extraordinary things in him, but was both ambitious and virulent out of measure, and had a singular talent of asserting paradoxes with a great assurance, shewing no shame when he was detected in them, though this was done in many instances: But he let all these pass, without confessing his errors, or pretending to justify himself. He went on, still venting new falsehoods in so barefaced a manner, that he seemed to have outdone the Jesuits themselves." *History of his own Times*, vol. ii. p. 249.

[†] A writer in the Tatler gives the following very high commendation of Bishop Atterbury's talents as a preacher, and particularly of his powers in elocution:

"He has so particular a regard to his congregation, that he commits to memory what he has to say to them; and has so soft and graceful a behaviour, that it must attract your attention. His person, it is to be confessed, is no small recommendation; but he is to be highly commended for not losing that advantage, and adding to the propriety of speech (which might pass the criticism of Longinus) an action which would have been approved by Demosthenes. He has a peculiar force in his way; and has many of his audience, who could not be intelligent hearers of his discourse, were there not explanation as well as grace in his action. This art of his is used with most exact and honest skill. He never attempts your passions till he has convinced your reason. All the objections which you can form are laid open and dispersed, before he uses the least vehemence in his sermon; but when he thinks he has your head, he very soon wins your heart; and never pretends to shew the beauty of holiness, till he has convinced you of the truth of it. B."

ATTICA, a country of Greece, immediately to the east of Peloponnesus, from which it is separated by the Saronic Gulf. That gulf and the Ægean Sea form it into a species of peninsula. By land, it joins with Bœotia. The soil is barren, except in olives, for which it has always been famous, and in honey, which it produces copiously and of the best quality, from Mount Hymettus.

The people of Attica were anciently divided into ten tribes, who derived their names from the most distinguished of its heroes. Three were afterwards added, in compliment to Ptolemy, king of Egypt, Attalus, king of Pergamus, and the emperor Adrian. These were subdivided into a hundred and seventy-four communities, the names of which have been searched out by the learned with indefatigable industry. They are given in Meursius (Attica,) or more correctly in Spon, (*Voyage d'Italie,*) where they may be found by any one who is desirous of such barren information.

Attica is chiefly distinguished as having for its

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* The following anecdote is given by Dr Maty, on the authority of Lord Chesterfield, as a proof of Bishop Atterbury's scepticism with regard to revelation:

"I went to Mr Pope," says Lord Chesterfield, "one morning, at Twickenham, and found a large folio Bible, with gilt clasps, lying before him upon his table, and, as I knew his way of thinking upon that book, I asked him jocosely, if he was going to write an answer to it? It is a present, said he, or rather a legacy, from my old friend the bishop of Rochester. I went to take my leave of him yesterday in the Tower, where I saw this Bible upon his table. After the first compliments, the bishop said to me, My friend Pope, considering your infirmities, and my age and exile, it is not likely that we should ever meet again, and therefore I give you this legacy, to remember me by it. Does your lordship abide by it yourself? I do. If you do, my lord, it is but lately. May I beg to know what new light, or arguments, may have prevailed with you now to entertain an opinion so contrary to that which you entertained of that book all the former part of your life? The bishop replied, We have not time to talk of these things; but take home the book; I will abide by it, and I recommend to you to do the same; so God bless you."—This story, which rests entirely upon the authority of Lord Chesterfield, seems to be now generally discredited. It is not only altogether uncorroborated, but is, on the contrary, clearly contradicted by numberless circumstances in the bishop's life and writings; and it has been directly confuted, in a very satisfactory manner, from a mere comparison of dates. See *Epistolary Correspondence, &c.* of the Bishop of Rochester, published by Mr Nichols, vol. ii. p. 79. Notes.

† It is certain that he suspended, for three years, a Mr Gibbon, curate of Gravesend, a clergyman of worth and learning, because he had granted the use of his church for divine service to the Dutch troops, who came to assist in subduing the rebellion. And a pamphlet, published at Edinburgh in 1768 by Lord Hailes, the authenticity of which has never been questioned, details his correspondence in 1725 with several gentlemen in the north of Scotland, for the purpose of exciting commotions in favour of the Pretender. Thus, while in his letters from France he professes to have nothing in view but a quiet, literary, social life, and still to retain a warm attachment even to that part of the constitution which had injured him, he was actually engaged in moving and directing a scheme for rebellion and revolution.

Atticus Herodes.

capital ATHENS, in treating of which, we have given a full detail of its history. Besides Athens, it contained Eleusis, Sunium, and Marathon. (P)

ATTICUS, TIBERIUS CLAUDIUS HERODES, an opulent and munificent citizen of Athens. He was descended from a noble family of large possessions in the district of Marathon, whose lineage was traced back as far as Miltiades, the great hero of the place. His grandfather, Hipparchus, having been proscribed, and his property confiscated, Julius Atticus, the father of Herodes, found himself in a state of poverty, or rather feigned himself to be so: for when the good Nerva reigned, he discovered an immense treasure in his own house. Filled, it is pretended, with terror, rather than joy at this discovery, he immediately wrote a letter to the emperor in these words: "I have discovered, O emperor, a treasure in my house; what do you order to be done with it?" The answer of Nerva was equally laconic: "Use what you have found." Julius wrote back, that it was "more than he could use." "Abuse it then," replied the emperor; "for it is your own." Julius after this resumed the proper rank of his family: and this fortune, together with other possessions, paternal and maternal, which soon accumulated in the person of his son, rendered him the richest individual that Attica ever produced.

Herodes possessed excellent talents, which fitted him to shine in any situation. His attention, however, was principally directed, according to the taste of the age, to the study of rhetoric, in which he made distinguished proficiency under Scopelian, and other masters of repute: and such was the force and propriety of his eloquence, that when yet a youth, he was selected to be the head of a deputation to the emperor Hadrian, who was then at Sirmium in Pannonia. The situation, however, was new. Young Herodes failed in his attempt to deliver a speech, and was so mortified at his misfortune, that he had some thoughts of throwing himself into the Danube. But this precipitate resolution was soon succeeded by a more rational remedy. Far from being disgusted by the accident with his favourite pursuit, he, on the contrary, redoubled his perseverance; and attained to such eminence in eloquence and philosophy, that he still lives, in biography, among the orators and wise men of Greece and Rome. His great celebrity attracted the attention of Titus Antoninus, who appointed him to the high and honourable office of preceptor in eloquence to his two sons, M. Aurelius and L. Verus. From this station Herodes ascended to the summit of greatness, and was created consul A. D. 143. He was also constituted president of the Panhellenic and Panathenæan festivals, on which occasion he was crowned.

At a very early period, he obtained the government of the free cities in Asia, where he distinguished himself by many acts of munificence. Having observed that the chief city of Troas was badly supplied with water, he obtained from Hadrian a grant of three millions of sesterces for the construction of an aqueduct; but such was his natural attachment to grand designs, that he laid out seven millions instead of three, in the execution of it. Of this profusion Hadrian complained to the father of Herodes, who, on that occasion, is noted by the ancient writers for one of the most magnificent replies ever made to an emperor. "Hadrian," said the father, "be not discomposed by small matters: whatever he has spent above the three millions my son shall defray out of my fortune."

The death of his father occasioned a considerable quarrel between Herodes and his fellow citizens. Julius had lived more like a prince than a private man among the Athenians. His enormous wealth enabled him to distribute to that abject people the most ample largesses ever heard of. He sacrificed a hundred beeves in one day, and regaled the whole Athenian people by tribes and classes on several occasions. In his last will, he bequeathed to each individual, for life, an annuity of one *mina*, or about three guineas sterling; a sum which, in those days, was very considerable. This enormous bequest, dictated more by patriotism than sound judgment, was but ill relished by Herodes, who resolved to withhold it. Having for this purpose got the people to an agreement, that, on his paying down five minæ at once, he should be relieved from all future demands, he collected all the accounts of old debts due by them to his father and himself, and presented these in part of payment. The people loudly exclaimed against this equitable procedure, and said that they were defrauded of the legacy; and when Herodes built the great stadium with this money, which had been intended for the encouragement of idleness and beggary, the people insisted, in derision, that it was called the Panathenaicum, not in honour of the festival, but as having been built by *all the Athenians.*

This stratagem, though it savours of ingenuity, is by no means to be considered as dictated by selfish considerations. There never was a man who had a more thorough contempt for the mere possession of riches than Herodes. The leading object of this celebrated character was to benefit the public by his princely fortune; and this application of it certainly entitles him to a distinguished rank in the annals of his country. It was a remark of his own, that wealth not applied for the common good, is but dead wealth; and that the chest of the miser is but a prison for riches. Those men who set so high a value on their money as to confine it to their coffers, he compared to the fanatics, who worshipped the god Mars, after having bound him. It was a noble maxim of this rich philosopher, that we ought to give, not only to relieve need, but also to prevent it. Boundless in his liberality to his friends and the necessitous, and influenced in his generosity by no paltry prejudice of language or country, it was his professed desire to accumulate treasure only in the affections of those around him, to promote learning and the arts, and to decorate the mighty empire to which he belonged. While other nobles were surrounded by musicians, players, and buffoons, the retinue of Herodes was composed of men of genius and learning, who found it their interest to court his notice. His public lectures, which he gave for the advantage of the youth, were numerously attended by people from all the neighbouring countries, and were well calculated to rouse the Athenians from that lethargy of genius into which they were now fallen. Some orations of his were still extant in the days of Suidas.

The encouragement which Herodes extended to men of literary pretensions exposed him occasionally to the arts of the designing. Aulus Gellius, who was one of his disciples and companions, relates one instance of this kind, which is much to the credit of his humanity. A man dressed in the style of a philosopher, wearing a cloak and a very long beard, presented himself to Herodes, and demanded some pecuniary assistance. On being asked who he was, the man replied, with indignant surprise, that he was a philosopher. "I see," observed Herodes, "the cloak and the beard; but I do not see the philosopher." When informed by one of the company that this was an impudent beggar, who was constantly teazing people for alms; "Well then," said Herodes, "let us give as men, though not as to a man."

The fame of Herodes chiefly rests now on his architectural works. His stadium, or race-course, on the banks of the Ilissus, which was four years in building, was the noblest work of the kind ever beheld. It was 630 feet long, 120 broad, and was constructed entirely of white marble. Mount Pentelicus was nearly consumed to supply materials for this magnificent pile, which itself, according to Pausanias, seemed at a distance to be a white mountain. Upon the death of his wife Regilla, to which his enemies had the cruelty to accuse him of being accessory, he was thrown into the deepest sorrow; and to perpetuate her memory, he built a noble theatre at Athens, called after her name. This structure, according to Philostratus, exceeded in magnificence all the theatres in the Roman empire, being roofed with cedar, and adorned with all manner of statuary. Herodes, besides, adorned Corinth with a costly temple, dedicated to Apollo a grand stadium at Delphi, built an aqueduct at Olympia in honour of Jupiter, repaired the Odeum of Pericles at Athens, erected baths at Thermopylæ for the use of the infirm, and, in short, decorated many cities in Italy, Greece, and Asia, with the most splendid and useful edifices. But the greatest of all his designs he unfortunately did not think it safe to execute. This was no less, than by cutting through the Isthmus, to unite the Corinthian and Saronic gulfs, and thus shorten the navigation on these coasts by 800 miles. He was heard to say, that this would be a monument which would discover to posterity the existence of a MAN, and that while it remained unfinished, he had done nothing for his country. The magnitude, however, of the undertaking, to which the power of a Nero had not been adequate, deterred him from proposing it to the emperor, whose jealousy of his wealth and popularity might be productive of fatal consequences.

In his person Herodes was of a gigantic stature, being, it is said, eight feet high, and strong and brawny in proportion. He wore but a small quantity of hair; his nose was aquiline; his eye brows were thick, and joined into one; his eye, which was remarkably lively, was at the same time full of sweetness and complacency. He had a son, who, like the sons of many other great men, was distinguished for nothing but idleness and vice. When a boy, he was exceedingly dull: and to make him learn, Herodes was obliged to keep in the house a living alphabet, consisting of four-and-twenty boys, each of whom went by the name of a particular letter. The philosopher had too much principle to entrust the whole of his wealth to such a fool.

The celebrity of Herodes Atticus, it is true, is owing chiefly to the accidental circumstance of being possessed of a great fortune. But if we reflect on the purposes to which he devoted that wealth; the liberality with which he relieved want; the encouragement which he gave to learning by example and munificence; the edifices which he reared in various parts of the empire for the important purposes of public splendour and convenience; he is fully entitled to a station in the temple of immortality. His example is an eternal satire on the conduct of all those men of rank and opulence, who, instead of consecrating a part of their superabundant affluence to the same elegant and useful pursuits, lay it out in the purchase of a few selfish sensations. He died at his family residence in Marathon at the age of 76, and was buried with great pomp at Athens. His funeral oration was pronounced, in a most feeling manner, by the philosopher Adrian, his disciple and friend, who, in recounting the eminent services of the deceased to his country, drew tears from the eyes of all the Athenians. See Philostratus, *Sophistarum vitæ*, l. ii. c. 1. Suid. *Lexic.* *Aulus Gellius*, l. i. c. 2; l. ix. c. 2; l. xix. c. 12. (E)

ATTICUS, TITUS POMPONIUS CÆCILIUS, was descended of one of the most ancient families in Rome. He was of the equestrian order; and whether we consider him as an intimate associate of the great, a prudent politician, or a dignified man of letters, he is one of the most honourable men that his country ever produced. He was born during the latter period of the republic: a time when the convulsions of a mighty state, now on the verge of dissolution, necessarily disclosed the real characters of men, and compelled the mind to exert to the utmost all the faculties bestowed upon it by nature. Hence it was that, at this memorable period, there arose such a constellation of geniuses, both in arts and in arms, as the world in all probability will never again witness.

His father being distinguished for his attention both to his domestic affairs and to the study of letters; two of the greatest of human advantages, fortune and education, were thus secured to young Atticus. When yet a child, he is said to have discovered undoubted signs of natural talent. He is described as possessing, at that tender age, a most engaging manner, a quick apprehension, and a peculiar gracefulness of cadence and elocution; qualities which, while they commanded the respect of his companions, inspired them not a little with secret jealousy. It will give the reader a higher idea of the excellence of his parts than any description could produce, to be informed, that those youths, who were thus mortified at the superiority of Atticus, were L. Torquatus, the younger Marius, and the great orator Cicero. Such, however, were his gentleness and conciliating manner, that while he excited the juvenile emulation of his companions, he, at the same time, was their chief fa-

Atticus Titus.

vourite, and retained their friendship to the end of life.

Having lost his father when young, and the civil commotions now beginning, between the parties of Cinna and Sylla, in which he had already lost an uncle; Atticus resolved when yet a youth, to abandon, for a time, the scene of tumult and danger, and to retire with the greater part of his fortune to Athens, then the asylum of learning and refinement. Here, amid the groves of the Academy, he indulged the elegant propensities of his genius, and made such distinguished progress in his acquaintance with the Greek language, that he wrote and spoke it with the same propriety as a native. It was from this circumstance, together with his long residence at Athens, that he obtained the surname of Atticus, a designation of which he seems to have been proud, and that by which the children of his friends were taught to speak of him. Cicero ends one of his letters to him thus: Κικερων ὁ μικρος ασπαζεται Τιτον Αθηναιον: "The little Cicero salutes Titus the Athenian."

The amiable qualities of his heart soon endeared Atticus to the Athenian people. His deportment was such, that while accessible to the humblest, he lost nothing of his dignity, but was on a level with the highest. His prudence was so well known, that his advice was solicited by the magistrates; while his purse was open to all, and the poorest of the people hailed him as their benefactor. He frequently relieved the embarrassments of the state, by advancing large sums of money without interest; thus saving the public from falling into the hands of usurers and extortioners; and on some occasion he distributed among the people large quantities of corn, with a liberality truly magnificent. Having continued for many years at Athens, dividing his time between the duties of his household, the pursuits of literature, the affairs of the city, and the interest of his friends, to many of whom he extended assistance when absent, he at last found the opportunity, which he had long desired, of returning to his native country.

On the return of tranquillity, accordingly, he took his departure from Athens. On this occasion, he received one of the finest compliments ever paid to a private individual; for the whole Athenian people assembled to witness his departure, and testified by their tears the genuine sorrow with which they were moved; and in his absence they did, what he had prevented with much difficulty while present; they erected statues in honour of him and his wife Pilia, in the most sacred parts of the city. This honour, it is probable, was not conferred on him till many years after his departure, since he was turned of 50 before he was married.

Thus loaded with the genuine honours of respect and gratitude, Atticus returned to enjoy the society of his early friends, who were now leading characters in the state. His school-fellow L. Torquatus was that year consul; Hortensius, his intimate friend, made a great figure as a public orator; as did also M. T. Cicero. It was difficult to say which of these two loved him most; and it is mentioned as a singular instance of his delicate management, that though they frequently met in his company, these rival orators never gave vent to that acrimony of speech, which was natural to two angry competitors for public applause. His connection with Cicero was, if possible, rendered still more intimate by the marriage of Q. Cicero, the brother of the orator, with Pomponia the sister of Atticus. Of this match, which was brought about by Cicero, frequent mention is made in the letters of that orator to Atticus. These, consisting of sixteen books, are still extant; and for sprightliness of wit, accuracy of political information, and expressions of ardent and genuine friendship, they may be safely opposed to any epistolary collection in existence.

The paternal inheritance of Atticus was ample, though not splendid. But on the death of his uncle Q. Cæcilius, his fortune received a considerable accession. This old man was of a remarkably peevish disposition, insomuch that few could bear his humour; but Atticus so won upon him by his dutiful attentions, that he adopted him as his son, and left him an inheritance of 10,000,000 sesterces, or near £100,000 sterling. The unsettled state of affairs at home, and his long relegation at Athens, prevented him from marrying till considerably advanced in life. His wife's name was Pilia; but who she was, or what were her connections, no author has mentioned. By this marriage he had a daughter Pomponia, who was married to Agrippa the favourite of Augustus: and his granddaughter again by this marriage was betrothed by command of Augustus, almost as soon as she was born, to Tiberius, who was afterwards emperor. Nothing can be more decisive of the high consideration in which Atticus was held, and of his extensive though secret influence in the state, than this alliance into which he was pressed with the family of the Cæsars.

In his political life Atticus pursued a line of conduct which would not have been tolerated by the law of Solon; for in all the disturbances which took place at Rome during that eventful period, he so managed matters, that he was seldom implicated on either side. His friendship for Cicero, it is true, induced him to violate this principle of neutrality to a certain extent; and he had no hesitation to declare himself openly against such a character as Catiline. But, in general, such was his attachment to peace and repose, that even in his boyish days, nothing could prevail upon him to enlist under the banners of faction. This firm adherence to professed principle could not well be displeasing to either party; for though he should happen, as he sometimes did, to give private assistance to one, yet this was ascribed by the other to private friendship, and not to his approbation of political conduct. Hence it happened that Atticus was always courted by the two hostile factions at the same time. Thus, while he relieved the wants of the exiled Marius, he was at that very time caressed by Sylla. Though he furnished some of his private friends with money, who were devoted to Pompey's cause, yet Cæsar was so little displeased at this, that he applauded the neutrality of Atticus: and, after his victory at Pharsalia, while that conqueror made large demands on the rich citizens for money, he not only never molested Atticus, but, on his account, pardoned his nephew, who had carried arms against him.

Atticus was always a powerful advocate for moderation and humanity during that sanguinary period; and to this circumstance, no less than to his strict neutrality, we are to ascribe his wonderful success in preserving the good opinion of all parties. It was his constant maxim to alleviate, as much as in him lay, by his influence and money, the misfortunes of the sufferers, to whatever cause they were attached. Thus, though his strict intimacy with Cicero rendered him naturally favourable to the interest of Brutus, in opposition to Antony; yet, when Antony's affairs seemed utterly irretrievable, and his friends went over to the other side, Atticus interposed his good offices, and restrained Cicero and his coadjutors not only from committing any violence on the person of Antony, but from persecuting his remaining adherents; whom he liberally supplied with whatever they required, out of his own pocket. Such, however, was the depravity of heart which influenced the proceedings of the triumvirate, that these services were not sufficient to prevent the name of Atticus from being inserted in the list of the proscribed. The fury of Antony raged to such a degree against Cicero, that he had resolved to extirpate from the face of the earth the orator and all his friends without a single exception. But the tyrant was prevailed upon to relent in favour of Atticus, who had retired into concealment: he wrote to him a letter with his own hand, inviting him to return, and sent a guard to escort him through the horrors of the night. It is a singular fact, that after Antony and Augustus quarrelled, Atticus continued to be their common friend: he frequently received letters from Antony, detailing his plans and operations in the East; while at the same time he maintained a daily correspondence with Augustus, who consulted him on the most important questions. The refined policy by which he conducted himself in this delicate predicament, almost justifies the eulogium of his panegyrist, when he says, that the history of Atticus has taught the world, "That man is fortunate or unfortunate, according to his own conduct."

The same prudence and forbearance which prevented Atticus from taking any active part in the civil commotions of his time, prevented him also from availing himself of many opportunities of obtaining public offices. The honour and emolument attached to these, he considered as completely counterbalanced by the cares and dangers from which they are inseparable in troublesome times. On more than one occasion, he might have obtained a province: but this he declined as incompatible with that rule of political quiet which he had adopted. To this indolence he was also probably inclined from the maxims of the Epicurean philosophy, to which he professed an attachment. As pleasure, that is, virtuous enjoyment, together with the absence of pain and care, constituted the sole object of his desire, he would be disposed not to interfere in the angry contentions of the world; but rather, like the gods of Epicurus, to observe them in dignified repose, at a distance. It is difficult to determine whether this political neutrality be altogether consistent with the interest which a good man ought to take in the welfare of his country. But the truth is, that the Roman empire at that time had extended itself over so many kingdoms and provinces, that the proper idea of country was in a great measure lost, and the feelings of patriotism, which are ever most ardent in a small state, could there have scarcely been excited.

In his domestic capacity, Atticus was equally interesting. He was remarkably assiduous in the management of his private affairs, taking charge not only of his own, but of those of Cicero, Marius, Hortensius, Cato, and others. Though his revenue was considerable, his expenses were extremely moderate, He had no magnificent equipage, nor costly villa: in all things he was partial to the simplicity of the ancients, whose manners he had thoroughly studied. His house, which stood on the Quirinal hill, was a plain old edifice; though at the same time abundantly convenient, and suitable to his equestrian rank: and here every thing was equally remote from meanness and ostentation. Splendid occasionally in his hospitality, and entertaining, as he did, men of the most exalted condition, such as Cicero, Cæsar, Antony, and Augustus; still there was displayed more politeness than magnificence; more neatness than show. It was his peculiar praise, that of all his household, there was none who was not born under his own roof; and every person, to the meanest lacquey, was a proficient in the valuable arts of reading and writing. His feasts were never attended by bands of music, nor accompanied by any sumptuous exhibitions, such as were agreeable to the gross taste of most of his cotemporaries. The only vocal entertainment allowed by him on these occasions was *reading*, which was performed by persons trained for the purpose; and this rational amusement communicated the most lively pleasure to the guests, who, he took care, were always of the same taste with himself. What must have been the elegance of the remarks, and the interest of the whole amusement, when the company consisted of Atticus, Cicero, Cæsar, the poet Callidius, Sallust, Hortensius, Cornelius Nepos, and similar men of letters!

In conversation, Atticus was so fascinating, that young men preferred his company to that of their own equals: but in his gayest moments, he had such a regard for decorum, that when even in jest, he had an air of dignity and elevation; so that it was uncertain whether he was more beloved or respected by his friends. Enviable talent! which could thus temper the suavity of the companion with the dignity of the instructor; which could insensibly charm the levity of youth into the chastened majesty of philosophy!

In his attachment to his friends, Atticus possessed the utmost steadiness, and, unlike many a pretended patron, when he once made a promise, he considered the whole business as his own till he performed it. His economical style of living enabled him to indulge the generous dispositions of his heart to a much greater extent than most could afford, who even surpassed him in wealth. Money was not his object, but the luxury of bestowing it well; and this he often did in the noblest manner. When Brutus was in the plenitude of his power, Atticus refused to support him; but his fortunes were no sooner broken, than he relieved his private necessity by a princely donation. To Cicero, when stript of his possessions, and driven into exile, his faithful friend sent a sum of money in his distress, amounting to £2000 sterling.

Of his filial and fraternal affection, we may judge, from the funeral oration pronounced by him, at the age of 63, over his mother, whom he buried in her 90th year. He there declared, that he never in his life had occasion to be reconciled to his mother, nor had ever any quarrel with his sister, who was then much of his own age. Mr Bayle is pleased to be witty on this declaration, regretting that the orator said nothing about his wife Pilia, whom he therefore suspects of having been on bad terms with her husband. But Mr Bayle ought to recollect that he had not then been long married, whereas he had all his life maintained a close intercourse with those to whom he paid so elegant a compliment.

Atticus made a considerable figure in his own time as a writer. He kept up an epistolary correspondence with the most eminent characters of that period. Of his correspondence with Cicero, we have a lasting monument in the letters which he received from that orator. He wrote a book of historical antiquities, into which he introduced genealogical tables of the principal families in Rome. He also composed, in Greek, an account of the consulship of Cicero, with which the latter declared himself to be well pleased, only that the style appeared somewhat unpolished and unadorned. Nor did Atticus altogether neglect poetry, which he cultivated principally for the elegant taste which that study promotes. His chief effort in this way consisted in describing, under their pictures, the most remarkable actions of distinguished men, concerning whom he is said to have comprised an amazing quantity of information in the compass of four or five verses.

The constitution of Atticus was excellent, since, for thirty years together previously to his last illness, he had no occasion for a physician; and though now in the seventy-seventh year of his age, he was apparently as stout and hale as ever. About this time he was seized with a distemper which affected his intestines, and at last broke out into a sore; upon which, dreading a long continuance of pain, and supposing his fate to be inevitable, he resolved to anticipate nature by abstaining from food. Having sent for his son-in-law, Agrippa, and some more of his friends, he declared to them his fixed resolution, and requested that none of them would endeavour to dissuade him from it. He is said to have done all this with such a composed countenance, that he seemed to be only talking of passing from one house to another, and not from this world to the next. At the end of two days the pain and fever sensibly abated; but thinking it beneath him to recede from his purpose, he persisted in his abstinence, and on the fifth day after he had made the fatal resolution he breathed his last. Thus died Atticus the death of a Roman: that is, he shrunk from a temporary distress with a meanness unbecoming a man, and rushed into the other world before he was regularly summoned. But this presumption we must ascribe, in this instance, to the prejudices of the time, rather than to the individual. How different his conduct from that of a man, in similar circumstances, who has been styled the modern Atticus! "See," said Addison to his friends, probably in allusion to this very suicide of Atticus, "see how a *Christian* can die." Atticus was buried, according to his own request, without any funeral pomp, by the Appian way, in the tomb of his uncle Cæcilius.

Upon the whole, the most prominent feature in the character of Atticus, so far as it is known to us, was prudence. But we must avow our regret, that the piece ascribed to Cornelius Nepos should be the principal source of our information. That life is evidently intended for a panegyric, in which every thing great and amiable is ascribed to Atticus, without a single shade of failing, to the best of the writer's judgment. Atticus, however, was unquestionably a man of first rate consequence in his own time. His strict intimacy with that crafty tyrant Augustus, who was forward in marrying his nephew Tiberius to Agrippina, the grand-daughter of Atticus, is alone a full proof that he was an elevated character. The Epistles of Cicero, too, written when that orator and statesman was in the plenitude of his fame and power, breathe such an air of ardent friendship, unlimited confidence, and even anxious respect, that we cannot but conclude, independently of Nepos, that Atticus was a politician of first rate accomplishments, wealth, and influence. We say *politician*, for though he disclaimed the title, nothing can be more evident from the epistles of Cicero, than that Atticus had a very considerable share in the secret movements of the political machine, and that he at least sanctioned, if not suggested, a considerable degree of stratagem and intrigue for the accomplishment of his purposes. These, however, it must be confessed, were all of a gentle and amiable kind; and he seems to have been one of those few who rigidly shaped their conduct by the precepts of philosophy. This love of privacy was not the effect of timidity or indifference; it was founded on a settled plan of avoiding the troubles of the time, on the score of ultimate happiness. Atticus was splendid with economy; industrious with dignity; and his purse was open to relieve the wants of contending leaders, not because he had no public principle, but because these were his private friends, and were, perhaps, in his secret opinion, all equally devoid of patriotic motives. When two corrupt factions contended for the superiority, what wise man would join either, or make either his enemies? In short, Atticus was one of those humane conciliating characters who diminish the animosity of parties, and who, if more numerous, would entirely suppress it. The intrinsic value of his mind is the only foundation of his fame. Without having performed a single splendid action, or discharged any public function, or aimed at exciting the admiration of posterity by any remarkable monument of his taste, talents, or munificence, he has the singular felicity of being famous for ever on account of his mere personal worth! See M. T. Ciceronis *Epistolæ ad Atticum; Vita T. Pomponii Attici ex* Cornelio Nepote; Suetonii *Vita Tiberii*, c. 7.; Gassendi, *Vita Epicuri; Dict. de Bayle*. (E)

ATTILA, the son of Mundzuk, king of the Huns. In conjunction with his brother Bleda, he succeeded to the supreme government of the Huns, about the year 433. Bleda, however, was soon deprived of his government and his life by the cruel policy of his brother. Attila, according to the account of Jornandes, the Gothic historian, exhibited in his person and features the complete portrait of a modern Calmuc; having a large head, a swarthy complexion, small deep-seated eyes, a flat nose, a few hairs in the place of a beard, broad shoulders, and a short square body, of nervous strength, though of disproportioned form. With this vulgar figure, which, however, might be fashioned according to the most refined ideas of personal beauty among the Huns, he affected the haughty step and the commanding look of majesty. He had a way of rolling his eyes in savage fierceness, for the purpose of inspiring fear or reverence into the minds of beholders. This could not fail to produce its effect: It is easy for a despot to stare his trembling slaves out of countenance; and the barbarian princes, who confessed that they could not gaze with a steady eye on the divine majesty of the king of the Huns, were at least as sincere in their adulation as the servile flatterers of Augustus, who pretended to shrink from the lustre of his piercing eye. Attila delighted in war, but his policy was not inferior to his prowess; and he dexterously called in the aid of superstition, to assist him in establishing a power which made him the terror of the world, and, from the way in which it was exercised, acquired for him the title of *the scourge of God*. So far from considering this designation as any disgrace, he is said to have adopted it himself, as one of his titles of honour. A fortunate occurrence, or a well-concerted plot, seemed to mark him out as the favourite of heaven, and the destined conqueror of the world. The Scythians were accustomed to worship an iron scymitar, as the symbol of Mars; and the very sword of the god himself, together with the power which it conveyed, were supposed to be committed into the hand of Attila. A shepherd of the Huns perceiving one of the heifers to be wounded in the foot, followed the track of blood, till he discovered the point of a sword among the long grass; having carefully dug it up, he presented it to Attila, who joyfully accepted it as the property of the god of war, and as a pledge of his future victories.

The empire of Attila was of immense extent: those vast tracts of country anciently comprehended under the names of Scythia and Germany were subject to his controul; so that his dominions extended from the Danube on the one hand, almost to the confines of China on the other. He could, with ease, bring into the field an army of 500,000, or, according to others, of 700,000 men. This immense force was never suffered to remain long idle. On a frivolous pretence he invaded the eastern empire, which was at that time governed by the feeble hand of Theodosius. He swept every thing before him like a desolating inundation, and rolled the tide of carnage to the very gates of Constantinople. A historian of those times describes his progress in language which strongly expresses the extensive and absolute devastation which every where marked his steps: *Pene totam Europam, invasis excisisque civitatibus atque castellis, conrasit.* Attila himself used to say, that the grass never grew where his horse trod. The fear, or the policy of the western Romans, had induced them to leave the eastern empire to its fate. Theodosius being thus without any resources to oppose this formidable invader, was glad to accept such a peace from him as he chose to dictate. The terms, of course, were sufficiently humiliating. The conqueror demanded a large tract of territory, stretching along the southern banks of the Danube, from Singidunum, or Belgrade, as far as Novæ in Thrace: the breadth was defined by the vague computation of fifteen days journey. In the next place, the tribute, or subsidy, paid by the emperor, was to be raised from 700 pounds of gold to upwards of 2000; and an immediate contribution was to be paid to defray the expenses of the war: And lastly, all the Huns who had been taken in war were to be delivered immediately without ransom, whilst the Roman prisoners were obliged to purchase their freedom at the price of twelve pieces of gold for each man. This ignominious treaty was gladly subscribed by the emperor, who had no alternative between it and utter destruction. There was also another circumstance, which, though less hurtful to the public, was not less humiliating to the degenerate Romans of the East. When any of Attila's officers took a fancy to have a wealthy or beautiful wife, Theodosius was obliged to provide one, and thus to secure a temporary tranquillity by the sacrifice of private feelings.

Attila was continually harassing Theodosius with unwelcome embassies; and as the barbarian was extremely jealous of his consequence, the emperor was forced to make a suitable return; and the pride of Attila was not easily satisfied with the dignity of the persons who approached him in quality of ambassadors. At last Maximin, a principal person at the court of Constantinople, accepted with reluctance of the troublesome commission of reconciling the angry spirit of the king of the Huns. Priscus the historian accompanied him, and had an opportunity of making many curious observations on the singular manners of this formidable monarch, and of his barbarian subjects. The ambassadors of Theodosius proceeded, by toilsome journies, through countries depopulated by the ravages of the Huns, and covered with the bones of the slain. Having passed the hills of modern Servia, and crossed the Danube in canoes provided by the barbarians, they halted at no great distance from the camp of Attila. They were now continually exposed to the insolence and the caprice of the haughty conqueror. The ministers of Attila pressed Maximin to communicate the business and the instructions, which he reserved for the ear of their master; and, on his refusal to comply, he was commanded instantly to depart; the order was recalled; it was again repeated; and at last, when it was found impossible to subdue the patient firmness of Maximin, he was admitted into the royal presence; but instead of obtaining a decisive answer, he was compelled to undertake a remote journey towards the north, that Attila might enjoy the satisfaction of receiving in the same camp the ambassadors both of the eastern and western empire. During this journey, the wants of the ambassadors were plentifully supplied by the Huns, though the fare was very different from the luxuries of Constantinople. They had mead instead of wine; millet in place of bread; and for drink, they had a certain liquor which, according to Priscus, was distilled from barley. Having met with a disaster in the night-time, in consequence of a violent storm, they were kindly relieved by the barbarians, who were awakened by their cries. The widow of Bleda, Attila's brother, was particularly attentive on this occasion, and added to her other favours the gift, or at least the loan, of a sufficient number of beautiful and obsequious damsels. At last, after a fatiguing and harassing journey, they reached the capital of an empire, which for several thousand miles did not contain a single city. This capital seems to have been situated in Upper Hungary, between the Danube, the Teyss, and the Carpathian hills. It could not boast of a single stone building, except some baths, which had been lately constructed. The houses of the principal officers were all built of timber; and the palace of Attila, the most magnificent building in his dominions, was composed of the same material. This palace was enclosed by a lofty wall, or pallisade, of smooth square timber, intersected with high towers, but intended for ornament rather than use. Within this wall was a separate house for each of the numerous wives of Attila; and instead of the rigid confinement imposed by Asiatic jealousy, they politely admitted the Roman ambassadors to their presence, their table, and even to the freedom of an innocent embrace. The Huns, though meanly lodged, were fond of displaying those riches which were the fruit and evidence of their victories; accordingly the trappings of their horses, their swords, and their shoes, were studded with gold and precious stones; and their tables were profusely spread with plates, and goblets, and vases, of gold and silver, the work of Grecian artists. Attila alone assumed the superior pride of despising finery, and of adhering to the simplicity of Scythian manners: his dress, his arms, and the furniture of his horse, were plain, without ornament, and of a single colour; his table was served in wooden cups and platters; flesh was his only food; and he never tasted the luxury of bread.

Maximin was placed in a most perilous situation by the perfidy of his countrymen. He was ignorant that a conspiracy had been formed against the life of Attila; and that Vigilius, interpreter to the embassy, actually carried along with him a weighty purse of gold, to reward the services of the person who should destroy the king of the Huns. Attila, however, was fully apprised of every particular, by the confession of the person who had engaged to perform the service; and, therefore, instead of being surprised at the haughtiness and rudeness with which he treated the ambassadors, we have more reason to admire his magnanimity, in respecting the rights of hospitality, and in admitting into his presence the ministers of a prince, who had basely conspired against his life. Vigilius was instantly seized; and was forced to make a full discovery of the whole transaction. Attila spared his life; and under the name of ransom, accepted of two hundred pounds of gold for the life of a traitor, whom he disdained to punish. He immediately dispatched ambassadors to Constantinople to denounce vengeance against Theodosius, and to demand the head of Chrysaphius the eunuch, who had been the chief agent in the business. None of his demands could be denied. A solemn embassy was again sent to deprecate his wrath; and he condescended to pardon the emperor, the eunuch, and the interpreter.

Upon the death of Theodosius, Marcian, his successor, peremptorily refused to pay to Attila the accustomed tribute; and instructed his ambassador Apollonius to signify this refusal, in the very camp of the Huns. Attila enraged, sent an equal defiance to the courts of Ravenna and Constantinople: and his ambassadors addressed both the emperors in the same haughty language. "Attila, my lord and thy lord, commands thee to provide a palace for his immediate reception." Despising the eastern Romans, whom he had so often vanquished, he directed all his strength against the western empire. The nations from the Wolga to the Danube obeyed his summons, and poured their countless myriads on the devoted country of Gaul. The Roman empire was saved, on this occasion, by the policy and intrepidity of Ætius, whom Gibbon calls the last of the Romans. He formed a strict alliance with Theodoric, king of the Visigoths, who at that time reigned at Thoulouse: and, in conjunction with his warlike forces, boldly proceeded to meet the terror of Europe and of Asia on the plains of Chalons. Here a tremendous engagement took place. The centre of the Visigoths soon gave way, owing to the defection of some of their allies; Theodoric, their king, was slain whilst animating his men to battle; and Attila already began to exult in the confidence of victory. In this situation, Torismond, the son of Theodoric, who had occupied a rising ground, rushed down upon the Huns with irresistible fury: the Visigoths soon restored their order of battle, and Attila for the first time sustained a defeat. The number of slain, on this occasion, according to the lowest accounts, amounted to 162,000, whilst others swell it to nearly double that number.

The policy of Ætius probably saved the Huns from utter destruction: he saw that the empire had as much to fear from the victorious Goths, as from the Huns whom they had vanquished: he therefore persuaded Torismond, who was bent on revenging the death of his father, to return to Thoulouse, that he might disappoint the ambitious designs of his brothers. By this device, Attila was permitted to retire unmolested, and to recruit his forces for an invasion of Italy in the ensuing spring. He scarcely met with resistance but at Aquileia, which made a long and obstinate defence, but was at last taken and destroyed. Italy was completely at his mercy, when the feeble Valentinian resolved to try the effect of a supplicatory embassy. Avienus, a person of the highest dignity, and Leo, bishop of Rome, undertook the dangerous office of deprecating the wrath of the enraged barbarian: and the eloquence, majestic appearance, and sacerdotal robes of the bishop, had the same effect on Attila, that the appearance of the Jewish high priest is said to have had on the mind of Alexander. The safety of Italy was procured by the eloquence of the ambassadors, and the immense dowry of the princess Honoria. The empire was soon after freed from the fear of this formidable invader. Having added a beautiful maid, to the list of his innumerable wives, the marriage was celebrated with barbaric pomp, at his wooden palace beyond the Danube. The monarch retired, at a late hour, to the nuptial bed, oppressed with wine. His attendants continued to respect his pleasures, or his repose, the greatest part of the ensuing day; till the unusual silence alarmed their fears and their suspicions; and after attempting to awake Attila, by loud and repeated cries, they at length broke into the royal apartment. They found the trembling bride sitting by the bedside, hiding her face with her veil, and lamenting her own danger and the death of the king, who had expired during the night. An artery had suddenly burst; and as Attila lay in a supine posture, he was suffocated by a torrent of blood. It was reported at Constantinople, that on the fortunate night, in which he expired, Marcian beheld in a dream the bow of Attila broken asunder: and the report, says Gibbon, may be allowed to prove, how seldom the image of that formidable barbarian was absent from the mind of a Roman emperor.

The authentic materials for the history of Attila may be found in Jornandes, (*de Rebus Geticis*), and Priscus, (*Excerpta de Legationibus.*) See these materials collected by Gibbon in the last volume of his *History*. (*g*)

ATTOCK, a city and fortress of Hindostan, built on the site of the ancient *Taxila*, by Acbar, in 1581. It stands on the eastern bank of the Indus, and commands the narrow pass from Cabul to Lahore. E. Long. 71° 12′, N. Lat. 33° 6′. (*j*)

ATTORNEY, (*Attornatus*,) signifies one who is appointed by another to transact any business for him in his absence. An attorney is either public,—as those in the courts of record,—and is constituted by warrant from his client; or private,—to perform any particular act or piece of business,—who is usually appointed by *letter of attorney*. (*z*)

ATTORNEY At Law, is a person who manages the law business of another, by whom he is retained; the term being analogous to the procurator, or proctor, of the civilians and canonists.

Anciently, (according to the old Gothic constitution,) every suitor was obliged to appear and prosecute or defend his suit in person, unless by special license from the king; and this still continues to be the rule in criminal cases. But by sundry old statutes, from that of Westm. 2. c. 10., permission was granted for attornies to prosecute or defend any civil suit in the absence of the parties. An idiot, however, cannot, at this day, prosecute or defend by attorney, but must appear in person.

Attornies are admitted to the execution of their office by the superior courts of Westminster-hall. They are considered as officers of the respective courts in which they are admitted; on which account they enjoy many privileges; and are, on the other hand, peculiarly subject to the censure and animadversion of the judges. In order to enable one to practise as an attorney in any of these courts, he must be admitted and sworn an attorney of that particular court; and an attorney in the King's Bench cannot practise in the Common Pleas, nor *vice versa*. To practise in the Court of Chancery, it is also necessary to be admitted a solicitor therein.

There are divers statutes which regulate the admission, &c. of attornies; as, 3 Jac. I. c. 7; 12 Geo. I. c. 29; 2 Geo. II. c. 23; 22 Geo. II. c. 46; 23 Geo. II. c. 26, &c.

Besides the obligation of fidelity to his client, the attorney owes him diligence and secrecy; and, in certain cases, action lies at the suit of the client, against his attorney, for neglect of duty. Blackst. *Comment*. b. iii. ch. 2. Jacob's *Law Dict*.

In Scotland there is no class of law practitioners who take the name of attornies. The office there is not public, as in England, but private; and it is constituted by letters of attorney. The person who receives infeftment for another is also called the attorney. See Bell's *Dict. of the Law of Scotland*. (*z*)

ATTORNEY General, is the name given to a great law officer, and principal counsel for the crown, who is constituted such by the king's letters patent. His duty is to exhibit informations, and prosecute for the crown in matters criminal; and to file bills in the exchequer, for any thing which concerns the king in inheritance and profits. See Jacob's *Law Dict*. (*z*)

ATTORNMENT, or Attournment, (*Attornamentum*, from the Fr. *Tourner*,) in the law of England, signifies the tenant's acknowledgment of a new lord, in the sale of lands, &c.

This practice derives its origin from the nature of feudal tenures, and from the spirit of the feudal customs. For, as by that system it was held to be neither reasonable nor proper, that a feudatory should transfer his lord's gift to another, and substitute a new tenant, without the consent of the lord; neither, on the other hand, was it deemed allowable for a lord to alienate his seignory without the consent of his tenant, which consent was called an *attornment*. And the doctrine of attornment was afterwards extended to all lessees for life or years.

In the course of time, however, the necessity of attornment was modified and restricted by the statute *Quia emptores terrarum*, (18 Edw. I. st. I.); the statute of *uses* (27 Hen. VIII. c. 10.), and by the statute of *wills* (34 & 35 Hen. VIII. c. 5.) At length, both the necessity and efficacy of attornments were almost entirely taken away by the statute 4 and 5 Ann. c. 16, which enacts, that all grants and conveyances of manors, lands, rents, and reversions, &c. by fine or otherwise, shall be good, without the attornment of the tenants. And by the statute 11 Geo. II. c. 19. attornments of lands, &c. made by tenants to strangers claiming title to the estate of their landlords shall be null and void, and shall not affect their landlord's possession. This, however, shall not extend to annul any attornment made pursuant to a judgment at law, or with consent of the landlord; or to a mortgagee on a forfeited mortgage.

Since the passing of these statutes, the doctrine of attornment,—which formerly was one of the most copious and abstruse in the law,—may be considered as almost entirely obsolete and useless. See Jacob's *Law Dict*. (*z*)

ATTRACTION, Chemical, usually called Affinity, an attraction which exists between the minute particles of matter, which urges them together, and which keeps them united. It acts only at insensible distances, and becomes imperceptible when the distances between bodies is sensible. Hence we have no means of knowing the rate according to which it varies. Some philosophers have endeavoured to prove that it is merely a case of gravitation, and of course that it is inversely as the square of the distance; but the most cautious and best informed philosophers have inclined to the opinion, that it follows a different law, varying as $\frac{1}{d^3}$, or even according to some higher power. This in particular was the opinion of Sir Isaac Newton.

The opinion at present entertained by chemists is, that the affinity between bodies varies in intensity according to the body; for example, that the affinity between sulphuric acid and barytes, is not the same in point of force as the affinity between sulphuric acid and potash. This opinion is founded upon a well known fact, that if sulphuric acid be in combination with potash, if we mix barytes with the compound, the acid leaves the potash and unites with the barytes. Hence it was inferred, that sulphuric acid has a stronger affinity for barytes than it has for potash. On similar experiments the proportional strength of the affinity of various bodies for each other was founded, and the results were drawn up into tables, which were considered as denoting the strength of the affinity of different bodies for each other. Berthollet has lately shewn, that these decompositions are much more complicated than had been suspected, that they are never complete, and that they may be explained upon other principles. He has endeavoured to shew, that affinity in all cases produces combinations, and never decompositions; and that the decompositions which take place are owing to other circumstances, many of which he has enumerated. If this notion, which is at least plausible, be well founded, it destroys the whole doctrine of elective attractions. Berthollet has pointed out another method of determining the strength of affinity of various bodies for each other. According to him, that body, the least weight of which is capable of neutralizing an acid, has the greatest affinity for that acid. Thus, of all the bases capable of combining with sulphuric acid, the least weight of ammonia is capable of neutralizing a given quantity of the acid, while the greatest weight of barytes is required. According to this doctrine, ammonia has the strongest affinity, and barytes the weakest affinity of all the bases for sulphuric acid. This opinion seems at first sight plausible, but its plausibility depends upon the indefinite meaning attached to the word *neutralize*. The truth is, that at present we have no means whatever of determining either the intensity or the variation of the force called affinity, and know only that it exists, and that it is very strong.

Mr Davy has lately added a new and very curious fact respecting compounds. He has shewn, that when two particles are united, they are in different states of electricity, the one positive and the other negative, and that the difficulty of decomposing them depends upon the intensity of these states. Oxygen and acids are always negative; hydrogen, and alkalies, and earths, always positive. If, by means of electricity, we bring them into the same electrical state, as by making them both positive or both negative, then they instantly separate from each other, and the compound is decomposed. By this contrivance, he decomposed the alkalies and earths, and several of the acids and metallic oxides. Hence it is not unlikely that chemical affinity and electrical attractions may in reality be one and the same force. The subject is still involved in obscurity; but we may expect much elucidation from the skill and industry of the philosophers at present engaged in the investigation.

Mr Dalton has lately thrown out a very ingenious idea respecting chemical affinity, which deserves to be mentioned. According to him, bodies unite either atom to atom, or two or three atoms of one to one atom of another. Thus water is composed of an atom of oxygen and an atom of hydrogen united together; ammonia of an atom of hydrogen and an atom of azote united together; carbonic acid of two atoms of oxygen united to one of carbon. Sulphate of potash consists of a particle of sulphuric acid united to a particle of potash; supersulphate of potash of a particle of potash united to two particles of sulphuric acid. If we admit that matter is composed of atoms, as is at least probable, it is difficult to refuse admission to this hypothesis, though it is probable that more complicated cases may exist. For example, two atoms of one body may combine with three of another, and so on. It is even possible that the proportion in which bodies unite cannot always be represented by numbers. But this hypothesis of Dalton is much more probable, and corresponds much better with the phenomena, than the opposite one of Berthollet, that bodies combine in all proportions whatever. Dalton's hypothesis is very useful, because it facilitates the knowledge of the composition of bodies. For example, if water be composed of an atom of hydrogen and an atom of oxygen, it follows, from the known analysis of water, that the weight of an atom of hydrogen is to that of an atom of oxygen as 1 to 6. Hence we know, that when oxygen enters into a combination, it will always enter as 6, or as some multiple of 6. This is very observable in the metallic oxides. The quantity of oxygen in the second oxide is usually double that in the first oxide, and that in the third triple that in the first. The same thing is equally remarkable in the salts; the supersulphate of potash contains just double the quantity of sulphuric acid that exists in the sulphate, and all the supersalts contain twice as much acid as the neutral salts, with the same acid and base. This atomic theory of Mr Dalton, plausible as it is, will be overturned, if Mr Davy succeeds in proving that azote is a compound of oxygen and hydrogen, as his experiments already published give us some reason to suspect. (c)

ATTRACTION, PHYSICAL, comprehends the attraction of gravity, electricity, and magnetism, and that which is exerted upon light in its transmission through diaphanous bodies, or in its passage near those which are opaque. The theory of gravitation has already been fully discussed under the head of PHYSICAL ASTRONOMY, and the other kinds of attraction shall be treated of at full length under the articles to which they more particularly belong. It may be proper, however, to state in general, that the attrac

Attraction of Mountains.

ion of electrical and magnetical substances, like those f the planetary bodies, seems to follow the law of he inverse ratio of the squares of the distances. This as been ascertained by the accurate experiments nade with a torsion balance by the celebrated Cou- omb; and we are surprised to see it stated in some of he foreign journals, that M. Simon of Berlin, by neans of a balance made entirely of glass, has found he law of electrical action to be in the simple inverse atio of the distance. As the apparatus which he sed is said to have been less sensible than the orsion balance used by Coulomb, we are not dis- osed to put any confidence in this new result.

There is no method of ascertaining the law of the ttractive force, by which the rays of light are re- racted in their passage through transparent media; nd it is almost equally difficult to determine the rate f its variation when the luminous particles are in- ected by passing near opaque bodies. From some xperiments, however, we are led to conclude, that he ultimate effects produced by the inflecting body upon a row of particles placed at different distances from it, are in the simple inverse ratio of the distances.

It has been much disputed among philosophers, as has been already remarked in the preceding article, whether the attraction of affinity is merely a case of universal gravitation, or depends on some separate ause, and follows a different law. The first of these pinions has been maintained by Buffon, Libes, and we may perhaps add La Place. The last is the opinion of Newton, and has been adopted by most of his followers. We shall endeavour to give a short view of the reasoning that has been employed on both sides of the question.

In the chapter in *Physical* ASTRONOMY on the Gravitation to a Sphere, we have shewn, that when the law of the attracting force varies in the inverse ratio of the square of the distance, the total attraction of a sphere upon a particle, situated at any distance from it whatever, is the same as if all the attracting particles had been concentrated in the centre of the spherical body. Considering spheres as simple gravitating points, it is obvious, that the attraction of a sphere, upon a point in contact with it, can never be infinitely great, when compared with the attraction which it experiences when out of contact; for the radius of the sphere, which is in this case a measure of the attraction, must always have a finite ratio to the distance of the particle when out of contact.

When the attracting force varies as the cube of the distance, or according to any higher ratio, it has been shewn by Newton, (see the following article on the ATTRACTION *of Solids*,) that the attraction of the sphere is indefinitely greater when the particle is in contact than when it is placed at any finite distance. This result, which is conformable to the phenomena of chemical attraction, induced Newton to believe, that the law of the force was in the inverse ratio of the cube of the distance, or perhaps some higher power of the distance.

M. Libes has maintained, that when the law of the force is inversely in the duplicate ratio of the distance, the action of a sphere upon a particle in contact with it is not proportional to the radius of the sphere. "When the elementary molecule," he observes, "is placed on the surface of the sphere, it is in contact with one of the molecules of the solid, whose action is $= \infty$. The molecule of the sphere, situated at the opposite extremity of the same diameter, exerts upon the molecule attracted a force $= \frac{1}{\infty}$. Whence the two molecules of the sphere, of which one touches the attracted molecule, and the other is situated at the opposite extremity of the same diameter, do not attract the molecule in the same manner as they would do if they were united in the centre of the sphere; and, consequently, the action of a sphere upon an elementary molecule which it touches is not proportional to the radius. If the masses of two finite bodies which attract each other become infinitely small, their mutual action, in so far as their masses are concerned, will suffer an infinite diminution. But if these masses, which have become infinitely small, are in contact, their centres of action will be infinitely near each other, whence the attraction, when it follows the inverse ratio of the square of the distance, will be augmented infinitely more by the approximation of the centres of action than it was diminished by the extreme smallness of the masses, consequently the attraction is infinite." *Dict. de Physique*, vol. i. p. 100.

It has been suggested by La Place, that the distances between the molecules of bodies may be incomparably greater than the diameters of the molecules themselves, so that the density of each molecule is much greater than the density of the body in which it exists, or the density which it would have if all the matter of the molecule were uniformly distributed within the body. The attraction of a particle touching a sphere composed of these dense molecules would thus be very great, compared with the attraction which it would experience at a finite distance, even when the law of action was the same as that of gravity; so that if matter is thus constituted, the attraction of affinity may, in all probability, be only a case of universal gravitation. See COHESION, CAPILLARY *Attraction*, ELECTRICITY, MAGNETISM, and OPTICS. (*o*)

ATTRACTION OF MOUNTAINS. If every portion of matter is attracted by every other portion of matter, with a force directly proportional to the number of gravitating particles, and inversely as the square of the distance, it might naturally be expected, that the attractive force of a large and solid mountain might be determined by direct experiments. Though the clouds and vapours which crown the summits of lofty mountains, or hover along their sides, evidently indicate the exertion of an attractive force, yet astronomers have sought for a more unequivocal proof of its existence, by measuring the deflection which it produced in attracting a plumb-line from its perpendicular position.

The earliest hint of this method was suggested by Sir Isaac Newton; and it was first put in execution by the French academicians, who were sent to measure a degree of the meridian in Peru. The celebrated Bouguer selected the mountain Chimboraco as the most proper for this purpose; and from a rough calculation he concluded, that its attraction would be equal to the 1000th part of that of the whole earth, and

Attraction of Mountains.

might produce a deviation in the plumb-line of nearly 43 seconds. In order to determine this experimentally, Bouguer and Condamine observed the altitudes of several stars from two stations, one on the north, and the other on the south side of the mountain. The difference between the altitudes obtained on each side, diminished by the difference of latitude between the two stations, will be double of the angle of deviation produced by the action of the mountain. Thus, in Plate XLIX. Fig. 1. if the plummets are attracted into the positions AB, CD, deviating from the vertical lines AP, CO, by the angles PAB, OCD, the difference of latitude between the stations O, P, which is measured by the celestial arch MN, will, in consequence of the deviation of the plumb-line, be measured by the arch *mn*. But the arch MN is known from the distance between the stations O, P; therefore, by subtracting the arch MN from the arch *mn*, found by taking the altitudes of a star, we obtain the sum of the arches M*n*, N*n*, which measure the two angles of deviation PAB, OCD, produced by the attraction of the mountain. In the case of Chimboraco, the angle of deviation was 8 seconds.

Plate XLIX. Fig 1.

Maskelyne's experiments on Shehallien.

This interesting experiment was repeated in this country by the learned Dr Maskelyne, with the view not merely of ascertaining in general the attraction of mountains, but for the purpose of determining from the result the mean density of the earth. The hill of Shehallien, in the county of Perth in Scotland, was reckoned the most convenient for this purpose, and preparations were made for executing this laborious undertaking in the summer of 1774. An observatory was erected about half way up the north side of the hill, and was afterwards removed to a similar position on the south side. No fewer than 337 observations were made with an excellent zenith sector of Sisson's upon 43 fixed stars; and it appeared from these observations, that the difference of latitude between the two stations was 54″.6. By the trigonometrical survey it was found, that the distance between the stations was 4364.4 feet, which in the latitude of 56° 40′ answers to a difference of latitude equal to 42″.94. The difference between these results, viz. 11″.6, is obviously the sum of the two deflections of the plumb-line, and therefore 5″.8 is the measure of the attraction of Shehallien. A complete survey of the mountain was next made, in order to determine its form and dimensions, for the purpose of calculating the attraction which it exerted upon the plumb-line of the sector. In order to accomplish this, the hill was supposed to be divided into a number of vertical pillars, and the action of each pillar upon the plumb-line was computed from its altitude and its distance from the observatory. From these computations, which were made with great labour by the learned Dr Charles Hutton, it appeared, that the whole attraction of the earth was to the sum of the two contrary attractions of the earth, as 9933 to 1, the density of the hill being supposed to be equal to the mean density of the earth. But the attraction of the earth is to the sum of the attractions of the hill nearly as radius is to the tangent of 11″.6, that is, as 17804 to 1, consequently the mean density of the earth is to the mean density of the hill as 17804 to 9933, or nearly as 9 to 5. Dr Hutton supposes the mean density of the hill to be nearly that of common free stone, or 2.5, consequently the density of the mountain will be had from the following analogy: 5 : 9=2.5 : 4.5 the earth's density, that of water being 1.

It is obvious, that the accuracy of this result depends on the correctness of the number 2.5, which is assumed as the average density of the hill. With the view of ascertaining the real density of Shehallien, a complete mineralogical survey of it has been recently made by Professor Playfair. He found that it consisted of granular quartz, whose average density was 2.64, and of mica slate, whose average density was 2.81; and that the density of a homogeneous mountain, that would have produced the same effect upon the plumb-line, was 2.716. Mr Playfair has, with great labour, computed the correction that must be made on the attraction of the mountain, in consequence of the variation in the specific gravity of its parts; and it would appear from these calculations, that the earth's density is about 4.867, a result which approaches nearer than the former to the result of Mr Cavendish's experiments on the attraction of leaden balls. A detailed account of Mr Playfair's survey and calculations will, we trust, be soon given to the public. To the kindness of that celebrated philosopher, the editor has been indebted for the preceding interesting facts.

The experiments made by Mr Cavendish on the attraction of leaden balls, in order to determine the density of the earth, are so intimately connected with the attraction of mountains, that we cannot omit the present opportunity of presenting our readers with an account of the apparatus which he employed, and the results to which he was conducted.

This ingenious and simple machine was invented for the purpose of measuring the earth's density, by the Rev. John Michell, a young and accomplished philosopher, who was carried off in early life from the scientific labours which he had so successfully begun. It afterwards came into the hands of Mr Cavendish, who made a few improvements on its construction, and conducted the experiment to a successful issue.

A longitudinal vertical section of the instrument is represented in Plate XLIX. Fig. 2. where GGHH is the building in which it was placed, and ABCDD CBAEFFE its case; *x* and *x* are the two balls which are suspended by the wires *hx* from the arm *ghmh*, which is itself suspended by the slender wire *gl*. This arm consists of a slender deal rod *hmh*, strengthened by a silver wire *hgh*, which renders it sufficiently strong to support the balls.

The case, which rests on posts β, β firmly fixed into the ground, is supported and set horizontal by four screws, two of which are seen at S, S. W and W are the leaden weights or balls, which are suspended from the centre-pin P*p* by the copper rods R*r*, P*r*R, and the wooden box *rr*. This centre pin passes through a hole in the beam HH, perpendicularly over the centre of the instrument, and turns round in it, being prevented from falling by the plate *p*. MM is a pulley fastened to this pin, and M*m* a cord coiled round the pulley, and passing through the end wall GG. By means of this cord the observer may turn round the pulley MM, and move the weights from one situation to the other.

It is obvious that the weights W, W conspire, by their action on the balls *x*, *x*, to turn the arm *hgh* in the same direction. Slips of ivory, divided into 20ths of an inch, are placed within the case at A, A, as near to the end of the arm as possible, for the purpose of determining its position. A small vernier scale, made of ivory, is fixed at the end of each arm, by means of which their motion may be estimated to less than the 100th of an inch. These divisions are viewed by means of the short telescopes T and T, through slits cut in the end of the case, and stopped with glass. They are illuminated by the lamps L and L with convex glasses, so placed as to throw their light on the divisions, the room being in every other respect dark. By means of the wooden rod FK, with an endless screw at its extremity, the observer is enabled to turn round the support ð, to which the wire *gl* is fastened, and then to move the wire till the arm settles in the middle of the case.

Let us now suppose that the arm *hgh* is at rest in a known position; then when the weights are moved, the arm will instantly be drawn aside by their attraction, but it will be made to vibrate, and its vibration will continue a great while. By measuring the length of these vibrations, and the time of their continuance, Cavendish found that the force which must be applied to each ball *x*, in order to draw the arm one division out of its natural position, is $\frac{1}{818N^2}$, N being the time of a vibration in seconds; and that the attraction of the weight on the ball is to the attraction of the earth upon it as .9779 to 1, or as 1 to 8739000 D, D being the density of the earth, and each of the weights weighing 2439000 grains, or being equal to 10.64 spherical feet of water. The attraction of the weight upon the ball will therefore be $\frac{1}{8739000D}$ of the weight of that ball, and consequently the attraction will be able to draw the arm out of its natural position by $\frac{818N^2}{8739000D}$, or $\frac{N^2}{10683D}$ divisions; and therefore if, on moving the weights from the midway to a new position, the arm is found to move B divisions, or if it moves 2B divisions on moving the weights from one near position to the other, it follows that the density of the earth, or D, is $\frac{N^2}{10683B}$. After correcting this result as obtained from each experiment, Mr Cavendish obtained the following Table of densities:

5.5	5.57	5.42
5.61	5.53	5.47
4.88	5.62	5.63
5.07	5.29	5.34
5.26	5.44	5.46
5.55	5.34	5.3
5.36	5.79	5.75
5.29	5.1	5.68
5.58	5.27	5.85
5.65	5.39	

From these results, it appears, that the mean density of the earth is nearly 5.48, a result considerably greater than that which was deduced from the attraction of Shehallien.

Another method of ascertaining the attraction of matter, has been suggested by the learned Dr Robison. He supposes that a sensible effect might be produced on a long plummet, or a nice spirit level, by the immense quantity of water which is brought to Annapolis Royal in Nova Scotia twice every day by the tides, which rise above an hundred feet. "If a leaden pipe," he observes, "a few hundred feet long, were laid on the level beach at right angles with the coast, and a glass pipe set upright at each end, and the whole filled with water; the water will rise at the outer end, and sink at the end next the land as the tide rises." See Bouguer's *Traité de la Figure de Terre*. *Phil. Trans.* 1775, vol. lxv. part ii. p. 495, 500. Id. 1778, vol. lxviii. p. 689. Id. 1798, p. 469. Pringle *On the Attraction of Mountains*, 9to, Lond. 1775; and Robison's *Elements of Mechanical Philosophy*, vol. i. p. 339. (*o*)

ATTRACTION OF SOLIDS. As this subject is so intimately connected with the important experiments on the attraction of mountains and leaden balls, and with many other branches of physics, and as it cannot be introduced with propriety under any other head, we shall present the reader with some of the most important and useful propositions, referring to other works for the complete discussion of the subject.

In the chapter of *Physical* ASTRONOMY, entitled, On the Gravitation of a Sphere, we have already entered upon the subject as connected with astronomy; we shall therefore resume the discussion where it was left in that article, following implicitly the steps of Newton, in so far as he has prosecuted the subject in the first book of his *Principia*. We shall then consider the subject of the solids of greatest attraction, which has been recently treated with such ability by Professor Playfair, availing ourselves of the kind permission of that distinguished philosopher, to give an abridged view of his valuable paper.

Attraction of spheres.

We have already seen, in the article already mentioned, that when the law of the force exerted by the particles is inversely as the square of the distance, the centripetal forces of the spheres themselves, on receding from the centre, decrease or increase according to the same law. It will appear from the two following propositions, that when the law of the force varies in the simple inverse ratio of the distance, the centripetal forces of the spheres in receding from the centre will vary according to the same law as the forces of the particles.

Prop. I.

If centripetal forces tend to the several points of spheres, proportional to the distances of those points from the attracted bodies; the compounded force, with which two spheres will attract each other mutually, is as the distance between the centres of the spheres.

PLATE XLIX. Fig. 3.

Case 1. Let AEBF be a sphere; S its centre; P a particle attracted; PASB the axis of the sphere passing through the centre of the particle; EF, *ef*, two planes, by which the sphere is cut, perpendicular to this axis, and equally distant on each side from the centre of the sphere; G, *g*, the intersections of the

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planes and the axis: and H any point in the plane EF. The centripetal force of the point H upon the particle P, exerted in the direction of the line PH, is as the distance PH; and according to the direction of the line PG, or towards the centre S, is as the length PG. Therefore, the force of all the points in the plane EF, that is, the force of the whole plane, by which the particle P is attracted towards the centre S, is as the distance PG multiplied by the number of those points; that is, as the solid which is contained under that plane EF and the distance PG. And, in like manner, the force of the plane *ef*, with which the particle P is attracted towards the centre S, is as that plane multiplied into its distance P*g*, or as the equal plane EF multiplied into that distance P*g*: and the sum of the forces of both planes as the plane EF multiplied into the sum of the distances $PG+Pg$; that is, as that plane multiplied into double the distance PS of the centre and the particle; that is, as double the plane EF multiplied into the distance PS; or as the sum of the equal planes $EF+ef$ multiplied into the same distance. And, by a like reasoning, the forces of all the planes in the whole sphere, equally distant on each side from the centre of the sphere, are as the sum of the planes multiplied into the distance PS; that is, as the whole sphere and as the distance PS jointly.

Case 2. Let the particle P now attract the sphere AEBF. And, by the same reasoning, it will be proved, that the force, with which that sphere is attracted, is as the distance PS.

Case 3. Let another sphere be now composed of innumerable particles P; and, since the force, with which each particle is attracted, is as the distance of the particle from the centre of the first sphere, and as the same sphere jointly; and therefore is the same, as if the whole proceeded from one particle in the centre of the sphere; the whole force, with which all the particles in the second sphere are attracted, that is, with which that whole sphere is attracted, will be the same, as if that sphere was attracted by a force proceeding from one particle in the centre of the first sphere; and therefore is proportional to the distance between the centres of the spheres.

Case 4. Let the spheres attract each other mutually, and the force being doubled will preserve the former proportion.

Case 5. Let the particle *p* be now placed within the sphere AEBF; and, since the force of the plane *ef* upon the particle is as the solid contained under that plane and the distance *pg*; and the contrary force of the plane EF as the solid contained under that plane and the distance *p*G; the force compounded of both will be as the difference of the solids; that is, as the sum of the equal planes multiplied into half the difference of the distances; that is, as that sum multiplied into *p*S, the distance of the particle from the centre of the sphere. And, by a like reasoning, the attraction of all the planes EF, *ef* in the whole sphere, that is, the attraction of the whole sphere is jointly as the sum of all the planes, or as the whole sphere, and as *p*S the distance of the particle from the centre of the sphere.

Case 6. And, if a new sphere be composed of innumerable particles *p*, placed within the former sphere AEBF; it may be proved as before, that either the single attraction of one towards the other, or the mutual attraction of both towards each other, will be as the distance of the centres *p*S.

If spheres are dissimilar and inequable in proceeding directly from the centre to the circumference; but are every where similar at every given distance in a circumference around; and the attractive force of every point is as the distance of the attracted body: the whole force, with which two spheres of this kind attract each other, is proportional to the distance between the centres of the spheres.

This is demonstrated from the preceding proposition, in the same manner as the Proposition in Chap. V. p. 691. col. 1. of *Physical* ASTRONOMY was demonstrated.

Cor. Those things which are demonstrated of the motion of bodies round the centres of conic sections, take place, when all the attractions are made by the force of spherical bodies of the quality already described, and the attracted bodies are spheres of the same kind.

If any circle AEB is described with the centre S; and two circles EF, *ef* are described with the centre P, cutting the former in E, *e*, and the line PS in F*f*; and ED, *ed* be let fall perpendicular to PS; then, if the distance of the arcs EF, *ef* is supposed to be continually diminished, the limit of the ratios of the variable line D*d* to the variable line F*f* is the same as the ratio of the line PE to the line PS.

For, if the line P*e* cuts the arc EF in *q*; and the right line E*e*, which approaches nearer than by any assignable difference to the arc E*e*, be produced, and meet the right line PS in T; and SG be let fall from S, perpendicular to PE: because of the similar triangles DTE, *d*T*e*, DES, D*d* will be to E*e*, as DT to TE, or DE to ES: and, because of the similar triangles E*eq*, ESG, E*e* will be to *cq* or F*f*, as ES to SG; and, *ex æquo*, D*d* to F*f*, as DE to SG; that is, because of the similar triangles PDE, PGS, as PE to PS.

Prop.

If EF*fe*, considered as a surface, by reason of its breadth being indefinitely diminished, describes a spherical concavo-convex solid by its revolution round the axis PS, to the several equal particles of which there tend equal centripetal forces; the force, with which that solid attracts a particle placed in P, is in a ratio compounded of the ratio of the solid $DE^2 \times Ff$, and the ratio of the force, with which a given particle in the place F*f* would attract the same particle in P.

For, if we first consider the force of the spherical surface FE, which is generated by the revolution of the arc FE, and is any where cut in *r* by the line *de*; the annular part of the surface, generated by the revolution of the arc *r*E, will be as the small line D*d*, the radius of the sphere PE remaining the same; as Archimedes has demonstrated in his book concerning the sphere and cylinder. And the force of this, exerted in the direction of the lines PE or P*r*, placed around in a conical surface, is as this annular surface itself; that is, as the line D*d*; or, which is the same, as the rectangle under the given radius PE of the sphere, and that line D*d*: but that force, acting in the direction of the line PS tending to the centre S, is less, in the ratio of PD to PE, and therefore as

$PD \times Dd$. Let the line DF be now supposed to be divided into innumerable equal particles, each of which may be called Dd; and the surface FE will be divided into as many equal annuli, whose forces will be as the sum of all the rectangles $PD \times Dd$; that is, as $\frac{1}{2}PF^2 - \frac{1}{2}PD^2$, and therefore as DE^2. Let the surface FE be now multiplied into the altitude Ff; and the force of the solid $EFfe$, exerted upon the particle P, will be as $DE^2 \times Ff$; supposing that the force is given, which any given particle Ff exerts upon the particle P, at the distance PF. But, if that force is not given, the force of the solid $EFfe$ will be as the solid $DE^2 \times Ff$, and that force not given, jointly.

If equal centripetal forces tend to the several equal parts of any sphere ABE, described about the centre S; and, from the several points D, perpendiculars DE are erected to the axis of the sphere AB, in which any particle P is placed, meeting the sphere in E; and in those perpendiculars the lengths DN are taken, which are as the quantity $\frac{DE^2 \times PS,}{PE}$, and the force, which a particle of the sphere, placed in the axis at the distance PE, exerts upon the particle P, jointly; I say, that the whole force, with which the particle P is attracted towards the sphere, is as the area ANB, contained between AB the axis of the sphere, and the curve line ANB, which the point N continually touches.

For, supposing the construction in the last lemma and theorem to remain, conceive the axis of the sphere AB to be divided into innumerable equal parts Dd, and the whole sphere to be divided into as many spherical concavo-convex laminæ $EFfe$; and let the perpendicular *dn* be erected. By the last theorem, the force, with which the lamina $EFfe$ attracts the particle P, is as $DE^2 \times Ff$, and the force of one particle exerted at the distance PE or PF, jointly. But, by the last lemma, Dd is to Ff as PE to PS; and therefore Ff is equal to $\frac{PS \times Dd}{PE}$; and $DE^2 \times Ff$ is equal to $Dd \times \frac{DE^2 \times PS}{PE}$; and therefore the force of the lamina $EFfe$ is as $Dd \times \frac{DE^2 \times PS}{PE}$, and the force of a particle exerted at the distance PF, jointly; that is, from the supposition, as $DN \times Dd$, or as the indefinitely small area $DNnd$. Therefore the forces of all the laminæ, exerted upon the particle P, are as all the areas $DNnd$; that is, the whole force of the sphere is as the whole area ANB.

Corol. 1. Hence, if the centripetal force tending to the several particles remains always the same at all distances, and Dn be made as $\frac{DE^2 \times PS}{PE}$, the whole force, with which the particle P is attracted by the sphere, is as the area ANB.

Corol. 2. If the centripetal force of the particles is reciprocally as the distance of the particle attracted by it, and DN is made as $\frac{DE^2 \times PS}{PE^2}$; the force, with which the particle P is attracted by the whole sphere, will be as the area ANB.

Cor. 3. If the centripetal force of the particles is reciprocally as the cube of the distance of the particle attracted by it, and DN is made as $\frac{DE^2 \times PS}{PE^4}$; the force, with which the particle P is attracted by the whole sphere, will be as the area ANB.

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Cor. 4. And universally, if the centripetal force, tending to the several particles of a sphere, is supposed to be reciprocally as the quantity V, and DN is made as $\frac{DE^2 \times PS}{PE \times V}$, the force, with which a particle is attracted by the whole sphere, will be as the area ANB.

Prop. V.

Supposing what has been already established, it is required to measure the area ANB.

Plate XLIX. Fig. 5.

From the point P let the right line PH be drawn, touching the sphere in H; and having let fall HI perpendicular to the axis PAB, let PI be bisected in L; and PE^2 will be equal to $PS^2 + SE^2 + 2PSD$. But, because the triangles SPH, SHI are similar, SE^2 or SH^2 is equal to the rectangle PSI. Therefore PE^2 is equal to the rectangle contained under PS and $PS + SI + 2SD$; that is, under PS and $2LS + 2SD$; that is, under PS and 2LD. Moreover, DE^2 is equal to $SE^2 - SD^2$, or $SE^2 - LS^2 + 2SLD - LD^2$; that is, $2SLD - LD^2 - ALB$. For $LS^2 - SE^2$, or $LS^2 - SA^2$, is equal to the rectangle ALB. Let therefore $2SLD - LD^2 - ALB$ be substituted for DE^2; and the quantity $\frac{DE^2 \times PS}{PE \times V}$, which, according to the fourth corollary of the preceding proposition, is as the length of the ordinate DN, will resolve itself into three parts, $\frac{2SLD \times PS}{PE \times V} - \frac{LD^2 \times PS}{PE \times V} - \frac{ALB \times PS}{PE \times V}$: where, if instead of V the inverse ratio of the centripetal force is substituted; and, instead of PE, the mean proportional between PS and 2LD; those three parts will become ordinates of as many curve lines, whose areas are found by the common methods.

Example 1. If the centripetal force, tending to the several particles of a sphere, is reciprocally as the distance, for V substitute the distance PE; then $2PS \times LD$ for PE^2; and DN will become as $SL - \frac{1}{2}LD - \frac{ALB}{2LD}$. Suppose DN equal to the double of this, $2SL - LD - \frac{ALB}{LD}$; and 2SL, the given part of the ordinate, drawn into the length AB, will describe the rectangular area $2SL \times AB$: and the indefinite part LD, drawn perpendicularly into the same length, by a continual motion, made according to such a law, that, in its motion, it may either by increasing or decreasing be always equal to the length LD, will describe the area $\frac{LB^2 - LA^2}{2}$; that is, the area $SL \times AB$; which, taken from the former area $2SL \times AB$, leaves the area $SL \times AB$. But the third part $\frac{ALB}{LD}$, drawn after the same manner, by a continual motion, perpendicularly into the into the same length, will describe an hyperbolic area; which, taken from the area $SL \times AB$, will leave ANB the area sought. Whence this construction of the problem arises. At the points L, A, B, erect the perpendiculars L*l*, A*a*, B*b*; of which A*a* may be equal to LB, and B*b* to LA. With the asymptotes L*l*, LB let the hyperbola *a b* be described through the points *a*, *b*. And the chord *b a* will inclose the area *a b a*, equal to the area ANB sought.

PLATE XLIX. Fig. 6.

Example 2. If the centripetal force, tending to the several particles of a sphere, is reciprocally as the cube of the distance; or, which is the same thing, as that cube applied to any given plane; subtitute $\frac{PE^3}{2AS^2}$ for V, then $2PS \times LD$ for PE^2; and DN will become as $\frac{SL \times AS^2}{PS \times LD} - \frac{AS^2}{2PS} - \frac{ALB \times AS^2}{2PS \times LD^2}$; that is, because PS, AS, SI are continually proportional, as $\frac{LSI}{LD} - \frac{1}{2}SI - \frac{ALB \times SI}{2LD^2}$. If the three parts of this quantity are drawn into the length AB, the first $\frac{LSI}{LD^2}$ will generate an hyperbolic area; the second $\frac{1}{2}SI$, the area $\frac{1}{2}AB \times SI$; the third $\frac{ALB \times SI}{2LD^2}$, the area $\frac{ALB \times SI}{2LA} - \frac{ALB \times SI}{2LB}$, that is, $\frac{1}{2}AB \times SI$. From the first let the sum of the second and third be subducted, and there will remain ANB the area sought. Whence this construction of the problem arises. At the points L, A, S, B, erect the perpendiculars L*l*, A*a*, S*s*, B*b*, of which let S*s* be equal to SI; and through the point *s* with the asymptotes L*l*, LB, let the hyperbola *a s b* be described, meeting the perpendiculars A*a*, B*b* in *a* and *b*; and the rectangle 2ASI, subducted from the hyperbolic area A*asb*B, will leave the area ANB sought.

Fig. 7.

Example 3. If the centripetal force, tending to the several particles of a sphere, decreases in the quadruplicate ratio of the distance from the particles; substitute $\frac{PE^4}{2AS^3}$ for V, then $\sqrt{2PS \times LD}$ for PE, and DN will become as $\frac{SI^2 \times SL}{\sqrt{2SI}} \times \frac{1}{\sqrt{LD^3}} - \frac{SI^2}{2\sqrt{2SI}} \times \frac{1}{\sqrt{LD}} - \frac{SI^2 \times ALB}{2\sqrt{2SI}} \times \frac{1}{\sqrt{LD^5}}$. Whose three parts, drawn into the length AB, produce as many areas, namely, $\frac{2SI^2 \times SL}{\sqrt{2SI}}$ into $\overline{\frac{1}{\sqrt{LA}} - \frac{1}{\sqrt{LB}}}$; $\frac{SI^2}{\sqrt{2SI}}$ into $\overline{\sqrt{LB} - \sqrt{LA}}$; and $\frac{SI^2 \times ALB}{3\sqrt{2SI}}$ into $\overline{\frac{1}{\sqrt{LA^3}} - \frac{1}{\sqrt{LB^3}}}$. And these, after a due reduction, become $\frac{2SI^2 \times SL}{LI}$, SI^2 and $SI^2 + \frac{2SI^3}{3LI}$. But these, by taking away the latter terms from the former, become $\frac{4SI^3}{3LI}$. Therefore the whole force, with which the particle P is attracted to the centre of the sphere, is as $\frac{SI^3}{PI}$; that is, reciprocally as $PS^3 \times PI$.

The attraction of a particle placed within a sphere may be determined by the same method; but more expeditiously by the following proposition.

Prop.

PLATE XLIX Fig. 5.

If SI, SA, SP are taken continually proportional, in a sphere described about the centre S, with the interval SA; the attraction of a particle within the sphere, in any place I, is to its attraction without the sphere in the place P, in a ratio compounded of the subduplicate ratio of IS, PS, the distances from the centre, and the subduplicate ratio of the centripetal forces, tending to the centre in those places P and I.

As, if the centripetal forces of the particles of a sphere are reciprocally as the distances of a particle attracted by them; the force, with which a particle placed in I is attracted by the whole sphere, will be to the force, with which it is attracted in P, in a ratio compounded of the subduplicate ratio of the distance SI to the distance SP, and the subduplicate ratio of the centripetal force in the place I, arising from any particle in the centre, to the centripetal force in the place P, arising from the same particle in the centre; that is, in the subduplicate ratio of the distances SI, SP to each other reciprocally. These two subduplicate ratios compound the ratio of equality; and therefore the attractions in I and P, produced by the whole sphere, are equal. By a like calculation, if the forces of the particles of a sphere are reciprocally in the duplicate ratio of the distances, it will be collected, that the attraction in I is to the attraction in P, as the distance SP, to SA the semidiameter of the sphere. If those forces are reciprocally in the triplicate ratio of the distances, the attractions in I and P will be to each other as SP^2 to SA^2: if in a quadruplicate ratio, as SP^3 to SA^3. Therefore, since the attraction in P, in this last case, was found to be reciprocally as $PS^3 \times PI$, the attraction in I will be reciprocally as $SA^3 \times PI$; that is, because SA^3 is given, reciprocally as PI. And the progression is the same indefinitely. The theorem is therefore demonstrated.

Retaining the construction above, and a particle being in any place P, the ordinate DN was found as $\frac{DE^2 \times PS}{PE \times V}$. Therefore, if IE is drawn, that ordinate for any other place I of the particle will become as $\frac{DE^2 \times IS}{IE \times V}$ (changing PS, and PE, for IS, and IE.) Suppose the centripetal forces, flowing from any point E of the sphere, to be to each other at the distances IE, PE, as PE^n to IE^n (where the number *n* denotes the index of the powers of PE and IE); and those ordinates will become as $\frac{DE^2 \times PS}{PE \times PE^n}$, and $\frac{DE^2 \times IS}{IE \times IE^n}$; whose ratio to each other is as $PS \times IE \times IE^n$ to $IS \times PE \times PE^n$. Since the triangles SPE, SEI are similar, on account of the lines SI, SE, SP being continually proportional; and from thence it follows, that IE is to PE, as IS to SE or SA; for the ratio of IE to PE substitute the ratio of IS to SA; and the ratio of the ordinates will become that of $PS \times IE^n$ to $SA \times PE^n$. But the ratio of PS to SA is the subduplicate ratio of the distances PS, SI; and the ratio of IE^n to PE^n (because IE is to PE, as IS to SA) is the subduplicate ratio of the forces at the distances PS, IS. Therefore the ordinates, and consequently the areas which the ordinates describe, and the attractions proportional to them, are in a ratio compounded of these subduplicate ratios.

To find the force, with which a particle, placed in the centre of a sphere, is attracted to any segment of that sphere.

Let P be a particle in the centre of a sphere, and RBSD a segment thereof, contained between the plane RDS, and the spherical surface RBS. Let BD be cut in F by a spherical surface EFG, described from the centre P; and let the segment be divided into the parts BREFGS, FEDG. But, let that surface be not purely mathematical, but physical, having a very inconsiderable thickness. Let that thickness be called O, and the surface, according to the demonstration of Archimedes, will be as $PF \times DF \times O$. Let us suppose moreover, that the attractive forces of the particles of the sphere are reciprocally as that power of the distances whose index is n; and the force, with which the surface EFG attracts the body P, will be as $\frac{DE^2 \times O}{PF^n}$; that is, as $\frac{2DF \times O}{PF^{n-1}} - \frac{DF^2 \times O}{PF^n}$. Let the perpendicular FN, drawn into O, be proportional to this quantity; and the curvilinear area BDI, which the ordinate FN, drawn through the length DB by a continual motion, describes, will be as the whole force, with which the whole segment RBSD attracts the body P.

VIII. To find the force, with which a particle, placed without the centre of a sphere, in the axis of any segment, is attracted by that segment.

ATE LIX. g. 5. Let the body P, placed in the axis ADB of the segment EBK, be attracted by that segment. With the centre P, at the interval PE, let the spherical surface EFK be described; with which let the segment be divided into two parts EBKFE, and EFKDE. Let the force of the former part be sought by Prop. V. and the force of the latter part by Prop. VII. and the sum of the forces will be the force of the whole segment EBKDE.

IX. If one body is attracted by another, and the attraction is very much stronger when it is contiguous to the attracting body, than when they are separated from each other by any interval, how small so ever; the forces of the particles of the attracting body, in the recess of the body attracted, decrease in a greater than the duplicate ratio of the distances from the particles.

For, if the forces decrease in a duplicate ratio of the distances from the particles; the attraction towards a spherical body, being reciprocally as the square of the distance of the attracted body from the centre of the sphere, will not be sensibly increased by the contact: and it will be still less increased by the contact, if the attraction in the recess of the body attracted, decreases in a less ratio. The proposition therefore is evident concerning attractive spheres. And the case of concave spherical orbs attracting external bodies is the same. And it is much more evident in orbs which attract bodies placed within them; because the attractions, diffused every where through the cavities of the orbs, are destroyed by contrary attractions, (See Chap. V. *Physical* ASTRONOMY,) and therefore have no effect even in contact. But, if from these spheres and spherical orbs any parts remote from the place of contact are taken away, and new parts are added any where; the figures of these attractive bodies may be changed at pleasure; and yet the parts added or taken away, being remote from the place of contact, will not remarkably increase the excess of attraction which arises from the contact. The proposition therefore is evident in bodies of all figures.

Attraction of Solids.

Prop. X. If the forces of the particles, of which an attractive body is composed, decrease, in the recess of the attracted body, in a triplicate or more than a triplicate ratio of the distances of the particles, the attraction will be very much stronger in contact, than when the attracting and attracted bodies are separated from each other by any interval, how small soever.

For it appears by the solution of Prop. V. exhibited in the second and third examples, that the attraction is indefinitely increased, when an attracted particle approaches to an attracting sphere of this kind. The same thing is also easily collected, by comparing those examples, and Prop. VI. together, concerning the attractions of bodies towards concavo-convex orbs, whether the attracted bodies are placed without the orbs, or within their cavities. But the proposition will also be universally evident concerning all bodies, by adding or taking away from these spheres and orbs any attractive matter, any where without the place of contact, so that the attractive bodies may assume any assigned figure.

Prop. XI. If two bodies, similar to each other, and consisting of matter equally attractive, attract separately particles proportional to, and similarly situated with respect of themselves; the accelerative attractions of the particles towards the whole bodies will be, as the accelerative attractions of those particles towards particles of the bodies proportional to the whole, and similarly situated in them.

For, if the bodies are divided into particles, which are proportional to the whole bodies, and similarly situated in them; it will be, as the attraction towards any particle of one body is to the attraction towards the corresponding particle of the other body, so are the attractions towards the several particles of the first body, to the attractions towards the several corresponding particles of the other body: and, by composition, so is the attraction towards the first whole body, to the attraction towards the second whole body.

Cor. 1. Therefore, if the attractive forces of particles, by increasing the distances of the attracted particles, decrease in the ratio of any power of the distances; the accelerative attractions towards the whole bodies will be, as the bodies directly, and those powers of the distances inversely. As, if the forces of particles decrease in a duplicate ratio of the distances from the particles attracted, and the bodies are as A^3 and B^3; and therefore, both the cubic sides of the bodies, and the distances of the attracted particles from the bodies, are as A and B; the accelerative attractions towards the bodies will be as $\frac{A^3}{A^2}$ and $\frac{B^3}{B^2}$; that is, as A and B the cubic sides of the bodies. If the forces of particles decrease in the triplicate ratio of the distances from the attracted particles, the accelerative attractions towards the whole bodies will be as $\frac{A^3}{A^3}$ and $\frac{B^3}{B^3}$; that is, equal. If the forces decrease in a quadruplicate ratio, the attractions towards the bodies will be as $\frac{A^3}{A^4}$ and $\frac{B^3}{B^4}$; that is, reciprocally as the cubic sides A and B. And so on in other cases.

Cor. 2. Hence, on the contrary, the ratio of the decrease of the forces of attractive particles, in the recess of the attracted particle, may be collected from the forces, with which similar bodies attract particles similarly situated; if only that decrease is directly or inversely in any ratio of the distances.

Prop. XII. If the attractive forces of equal particles of any body are as the distances of the places from the particles; the forces of the whole body will tend to its centre of gravity; and will be the same with the force of a globe, consisting of similar and equal matter, and having its centre in the centre of gravity.

Plate XLIX. Fig. 9. Let the particles A, B, of the body RSTV attract any particle Z with forces, which, if the particles are equal to each other, are as the distances AZ, BZ; but, if the particles are supposed unequal, are as those particles, and their distances AZ, BZ, jointly; or, as those particles drawn into their distances AZ, BZ, respectively. And let these forces be expressed by those contents, $A \times AZ$ and $B \times BZ$. Let AB be joined, and let it be cut in G, so that AG may be to BG, as the particle B to the particle A; and G will be the common centre of gravity of the particles A and B. The force $A \times AZ$ is resolved into the forces $A \times GZ$ and $A \times AG$; and the force $B \times BZ$ into the forces $B \times GZ$ and $B \times BG$. But the forces $A \times AG$ and $B \times BG$, because A is to B as BG to AG, are equal; and therefore, when they are directed towards contrary parts, destroy each other. The forces $A \times GZ$ and $B \times GZ$ remain. These tend from Z towards the centre G, and compose the force $\overline{A+B} \times GZ$; that is, the same force, as if the attractive particles A and B were placed in their common centre of gravity G, composing there a globe.

By the same reasoning, if a third particle C is added, and the force of this is compounded with the force $\overline{A+B} \times GZ$, tending to the centre G; the force thence arising will tend to the common centre of gravity of that globe in G, and of the particle C; that is to the common centre of gravity of the three particles A, B, C; and will be the same as if that globe and the particle C were placed in that common centre, composing there a greater globe. And thus we may go on continually. Therefore, the whole force of all the particles of any body RSTV is the same as if that body, preserving its centre of gravity, was to assume the figure of a globe.

Cor. Hence, the motion of the attracted body Z will be the same, as if the attracting body RSTV was spherical: and therefore, if that attracting body is either at rest, or proceeds uniformly in a right line, the body attracted will move in an ellipsis, having its centre in the centre of gravity of the attracting body.

If there are several bodies consisting of equal particles, whose forces are as the distances of the places from each; the force, compounded of the forces of all, by which any particle is attracted, will tend to the common centre of gravity of the attracting bodies; and will be the same as if those attracting bodies, preserving their common centre of gravity, should unite there, and be formed into a globe.

This is demonstrated in the same manner as the foregoing proposition.

Cor. Therefore the motion of the attracted body will be the same, as if the attracting bodies, preserving their common centre of gravity, should unite there, and be formed into a globe. And therefore, if the common centre of gravity of the attracting bodies is either at rest, or proceeds uniformly in a right line; the body attracted will move in an ellipsis, having its centre in that common centre of gravity of the attracting bodies.

If equal centripetal forces tend to the several points of any circle, increasing or decreasing in any ratio of the distances; it is required to find the force with which a particle is attracted, placed any where in a right line, which stands perpendicularly to the plane of the circle at its centre.

Suppose a circle to be described about the centre A, with any interval AD, in a plane, to which the right line AP is perpendicular; and let it be required to find the force, with which any particle P is attracted towards the same. Let the right line PE be drawn to the attracted particle P from any point E of the circle. In the right line PA let PF be taken equal to PE, and let the perpendicular FK be erected, which may be as the force with which the point E attracts the particle P. And let IKL be the curve line, which the point K continually touches. Let that curve meet the plane of the circle in L. In PA let PH be taken equal to PD; and let the perpendicular HI be erected, meeting the curve in I; and the attraction of the particle P towards the circle will be as the area AHIL, multiplied into the altitude AP.

For, let a very small line E*e* be taken in AE. Let P*e* be joined; and let PC, P*f* be taken in PE, PA, equal to P*e*. And since the force, with which any point E of the annulus described about the centre A, with the interval AE in the aforesaid plane, attracts the body P towards itself, is supposed to be as FK; and therefore the force, with which that point attracts the body P towards A, is as $\frac{AP \times FK}{PE}$; and the force, with which the whole annulus attracts the body P towards A, is as the annulus and $\frac{AP \times FK}{PE}$ jointly: but that annulus is as the rectangle under the radius AE and the breadth E*e*; and this rectangle (because PE and AE, E*e* and CE are proportional) is equal to the rectangle $PE \times CE$ or $PE \times Ff$; the force, with which that annulus attracts the body

P towards A, will be as PE × Ff and $\frac{AP \times FK}{PE}$ jointly; that is, as the quantity contained under Ff × FK × AP; or as the area FKkf multiplied into AP. And therefore the sum of the forces, with which all the annuli in the circle, which is described about the centre A with the interval AD, attract the body P towards A, is as the whole area AHIKL multiplied into AP.

Cor. 1. Hence it appears, that, if the forces of the points decrease in the duplicate ratio of the distances, that is, if FK is as $\frac{1}{PF^2}$, and therefore the area AHIKL as $\frac{1}{PA} - \frac{1}{PH}$, the attraction of the particle P towards the circle will be as $1 - \frac{PA}{PH}$; that is, as $\frac{AH}{PH}$.

Cor. 2. And universally, if the forces of the points at the distances D, are reciprocally as any power D^n of the distances; that is, if FK is as $\frac{1}{D^n}$, and therefore the area AHIKL as $\frac{1}{PA^{n-1}} - \frac{1}{PH^{n-1}}$; the attraction of the particle P towards the circle will be as $\frac{1^{1}}{PA^{n-2}} - \frac{PA}{PH^{n-1}}$.

Cor. 3. And, if the diameter of the circle is increased indefinitely, and the number n is greater than unity, the attraction of the particle P towards the whole plane indefinitely increased will be reciprocally as PA^{n-2}; because the other term $\frac{PA}{PH^{n-1}}$ will be less than any assignable quantity.

To find the attraction of a particle, placed in the axis of a round solid, to the several points of which there tend equal centripetal forces, decreasing in any ratio of the distances.

Let the particle P, placed in the axis AB, be attracted towards the solid DECG. Let this solid be cut by any circle RFS perpendicular to this axis; and in its semidiameter FS, in any plane PALKB passing through the axis, let the length FK be taken (by Prop. XIV.) proportional to the force, with which the particle P is attracted towards that circle. And let the point K touch the curve line LKI, meeting the planes of the exterior circles AL and BI in L and I; and the attraction of the particle P towards the solid will be as the area LABI.

Cor. 1. Hence it appears, that if the solid is a cylinder, described by the parallelogram ADEB revolved about the axis AB, and the centripetal forces tending to its several points are reciprocally as the squares of the distances from the points; the attraction of the particle P towards this cylinder will be as AB—PE+PD. For the ordinate FK (by Cor. 1. Prop. XIV.) will be as $1 - \frac{PF}{PR}$. The part 1, of this quantity, drawn into the length AB, describes the area 1 × AB. And the other part $\frac{PF}{PR}$, drawn into the length PB, describes the area 1 into $\overline{PE-AD}$, which may be easily shewn from the quadrature of the curve LKI: and, in like manner, the same part, drawn into the length PA, describes the area 1 into $\overline{PD-AD}$; and drawn into AB, the difference of PB, PA, describes 1 into $\overline{PE-PD}$, the difference of the areas. From the first content 1 into AB let the last content 1 into $\overline{PE-PD}$ be taken away, and the area LABI will remain equal to 1 into $\overline{AB-PE+PD}$. Therefore the force, proportional to this area, is as AB—PE+PD.

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PLATE XLIX. Fig. 13.

Cor. 2. Hence also the force is known by which a spheroid AGBC attracts any body P, placed externally in its axis AB. Let NKRM be a conic section, whose ordinate ER, perpendicular to PE, may be always equal to the length of the line PD, which is drawn to that point D, in which that ordinate cuts the spheroid. From the vertices A, B of the spheroid let AK, BM, be erected, perpendicular to its axis AB, respectively equal to AP, BP; and therefore meeting the conic section in K and M: and let KM be joined, cutting off from it the segment KMRK. Let S be the centre of the spheroid, and SC its greatest semidiameter; and the force, with which the spheroid attracts the body P, will be to the force, with which a sphere, described with the diameter AB, attracts the same body, as $\frac{AS \times CS^2 - PS \times KMRK}{PS^2 + CS^2 - AS^2}$ to $\frac{AS^3}{3PS^2}$. And, by the same principles of calculation the forces of the segments of the spheroid might be found.

Fig. 14.

Cor. 3. But, if the particle is placed within the spheroid in its axis, the attraction will be as its distance from the centre. Which may be more easily collected by the following reasoning, whether the particle is in the axis, or in any other given diameter. Let AGOF be the attracting spheroid, S its centre, and P the body attracted. Let the semidiameter SPA, and also two right lines DE, FG, meeting the spheroid in D and E, F and G, be drawn through that body: and let PCM, HLN, be the surfaces of two interior spheroids, similar and concentric to the exterior; of which let the former pass through the body P, and cut the right lines DE and FG in B and C; and let the latter cut the same right lines in H, I, and K, L. Let all the spheroids have one common axis, and the parts of the right lines intercepted on each side DP and BE, FP and CG, DH and IE, FK and LG will be mutually equal; because the right lines DE, PB, and HI, are bisected in the same point; as also the right lines FG, PC, and KL. Conceive now DPF, EPG to represent opposite cones, described with the indefinitely small verticle angles DPF, EPG, and the lines DH, EI, to be also indefinitely small: and the particles of the cones DHKF, GLIE, cut off by the surfaces of the spheroids, by reason of the equality of the lines DH, EI, will be to each other as the squares of their distances from the particle P, and therefore will attract that particle equally. And, by a like reasoning, if the spaces DPF, EGCB are divided into particles by the surfaces of innumerable similar spheroids, concentric to, and having a common axis with the former, all these will equally attract the

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body P on both sides towards contrary parts. Therefore the forces of the cone DPF, and of the conical segment EGCB, are equal, and by their contrary actions destroy each other mutually. And the case is the same of the forces of all the matter without the interior spheroid PCBM. Therefore the body P is attracted by the interior spheroid PCBM alone; and therefore (by Chap. IV. *Physical* ASTRONOMY,) its attraction is to the force, with which the body A is attracted by the whole spheroid AGOD, as the distance PS to the distance AS.

Prop. XVI. An attracting body being given, it is required to find the ratio of the decrease of the centripetal forces, tending to its several points.

Of the body given, a sphere, or a cylinder, or some other regular figure is to be formed, whose law of attraction, agreeing to any ratio of decrease, may be found by Prop. IV. V. and XV. Then the force of attraction must be found by experiment at different distances; and the law of attraction towards the whole, thence discovered, will give the ratio of the decrease of the forces of the several parts.

Prop. XVII. If a solid, plane on one side, and indefinitely extended on all other sides, consists of equal particles equally attractive, whose forces, in receding from the solid, decrease in the ratio of any power of the distances greater than the square; and a particle, placed towards either part of the plane, is attracted by the force of the whole solid; the attractive force of the solid, in receding from its plane surface, will decrease in the ratio of a power, whose side is the distance of the particle from the plane, and whose index is less by three than the index of the power of the distances.

PLATE XLIX. Fig. 15.

Case 1. Let LG*l* be the plane by which the solid is terminated. And let the solid lie on the side of the plane towards I; and let it be resolved into innumerable planes *m*HM, *n*IN, *o*KO, &c. parallel to GL. And first let the attracted body C be placed without the solid. Let CGHI be drawn perpendicular to those innumerable planes; and let the attractive forces of the points of the solid decrease in the ratio of a power of the distances, whose index is the number *n* not less by three. Therefore (by Cor. 3. Prop. XIV.) the force with which any plane *m*HM attracts the point C, is reciprocally as CH^{n-2}. In the plane *m*HM let the length HM be taken reciprocally proportional to CH^{n-2}, and that force will be as HM. In like manner, in the several planes *l*GL, *n*IN, *o*KO, &c. let the lengths GL, IN, KO, &c. be taken reciprocally proportional to CG^{n-2}, CI^{n-2}, CK^{n-2}, &c. and the forces of those planes will be as the lengths so taken; and therefore the sum of the forces as the sum of the lengths; that is, the force of the whole solid as the area GLOK, produced indefinitely towards OK. But that area, by the known methods of quadratures, is reciprocally as CG^{n-3}, and therefore the force of the whole solid is reciprocally as CG^{n-3}.

Fig. 16.

Case 2. Let the particle C be now placed on the side of the plane *l*GL within the solid; and let the distance CK be taken equal to the distance CG. And the part of the solid LG*lo*K*o*, terminated by the parallel planes *l*GL, *o*KO, will attract the particle C, placed in the middle, to neither side; the contrary actions of the opposite points mutually destroying each other by their equality. Therefore the particle C is attracted by the force only of the solid placed beyond the plane OK. But this force, by the first case, is reciprocally as CK^{n-3}; that is, because CG, CK, are equal, reciprocally as CG^{n-3}.

Cor. 1. Hence, if the solid LGIN is terminated on each side by two parallel planes LG, IN, indefinitely extended; its attractive force is known, by subducting from the attractive force of the whole solid LGKO, indefinitely extended, the attractive force of the more distant part NIKO, indefinitely produced towards KO.

Cor. 2. If the more distant part of this indefinitely extended solid is rejected, when its attraction, compared with the attraction of the nearer part, is inconsiderable; the attraction of that nearer part, by increasing the distance, will decrease nearly in the ratio of the power CG^{n-3}.

Cor. 3. And hence, if any finite body, plane on one side, attracts a particle placed opposite the middle of that plane; and the distance between the particle and the plane, compared with the dimensions of the attracting body, is very small; and the attracting body consists of homogeneous particles, whose attractive forces decrease in the ratio of any power of the distances greater than the quadruplicate; the attractive force of the whole body will decrease nearly in the ratio of a power, whose side is that very small distance, and whose index is less by three the the index of the former power. This assertion does not hold good of a body consisting of particles, whose attractive forces decrease in the ratio of the triplicate power of the distances. Because, in this case, the attraction of the more distant part of the indefinitely extended body, in the second Corollary, is always indefinitely greater than the attraction of the nearer part.

The important investigations of Professor Playfair, respecting the solids of greatest attraction, were suggested by the experiments of Dr Maskelyne and Mr Cavendish to ascertain the density of the earth. In determining the figure which a given quantity of matter ought to have, in order to attract a particle in a given direction with the greatest possible force, Mr Playfair has obtained results remarkable for their simplicity, and highly interesting from their connection with experimental inquiries. In order to correct the conclusions obtained by Dr Hutton from Dr Maskelyne's observations, by taking into account the unequal density of the mountain, the methods of Dr Hutton could not always be pursued. This inconvenience Mr Playfair has remedied by the propositions respecting the attraction of a half or quarter cylinder on a particle placed in its axis. The elegance of the solutions, and the address with which Mr Playfair has conducted the whole of the investigation, will appear from the following propositions, which are selected from his paper on the *Solids of Greatest Attraction*, with the kind permission of that able mathematician.

To find the solid into which a mass of homogeneous matter must be formed, in order to attract a particle given in position, with the greatest force possible, in a given direction.

Let A (Fig. 1. Plate L.) be the particle given in position, AB the direction in which it is to be attracted; and ACBH a section of the solid required, by a plane passing through AB.

Since the attraction of the solid is a maximum, by hypothesis, any small variation in the figure of the solid, provided the quantity of matter remain the same, will not change the attraction in the direction AB. If, therefore, a small portion of matter be taken from any point C, in the superficies of the solid, and placed at D, another point in the same superficies, there will be no variation produced in the force which the solid exerts on the particle A, in the direction AB.

The curve ACB, therefore, is the locus of all the points in which a body being placed, will attract the particle A in the direction AB, with the same force.

This condition is sufficient to determine the nature of the curve ABC. From C, any point in that curve, draw CE perpendicular to AB; then if a mass of matter placed at C be called m^3, $\frac{m^3}{AC^2}$ will be the attraction of that mass on A, in the direction AC, and $\frac{m^3 \times AE}{AC^3}$ will be its attraction in the direction AB. As this is constant, it will be equal to $\frac{m^3}{AB^2}$, and therefore $AB^2 \times AE = AC^3$.

All the sections of the required solid, therefore, by planes passing through AB, have this property, that $AC^3 = AB^2 \times AE$; and as this equation is sufficient to determine the nature of the curve to which it belongs, therefore all the sections of the solid, by planes that pass through AB, are similar and equal curves; and the solid of consequence may be conceived to be generated by the revolution of ACB, any one of these curves, about AB as an axis.

The solid so generated may be called the *solid of greatest attraction;* and the line ACB, the *curve of equal attraction.*

To find the equation between the co-ordinates of ACB, the curve of equal attraction.

From C (Fig. 1.) draw CE perpendicular to AB; let $AB = a$, $AE = x$, $EC = y$. We have found $AB^2 \times AE = AC^3$, that is, $a^2 x = (x^2 + y^2)^{\frac{3}{2}}$, or $a^4 x^2 = (x^2 + y^2)^3$, which is an equation to a line of the 6th order.

To have y in terms of x, $x^2 + y^2 = a^{\frac{4}{3}} x^{\frac{2}{3}}$, $y^2 = a^{\frac{4}{3}} x^{\frac{2}{3}} - x^2$, and $y = x^{\frac{1}{3}} \sqrt{a^{\frac{4}{3}} - x^{\frac{4}{3}}}$.

Hence $y = 0$, both when $x = 0$, and when $x = a$. Also if x be supposed greater than a, y is impossible. No part of the curve, therefore, lies beyond B.

The parts of the curve on opposite sides of the line AB, are similar and equal, because the positive and negative values of y are equal. There is also another part of the curve on the side of A, opposite to B, similar and equal to ACB; for the values of y are the same whether x be positive or negative.

The curve may easily be constructed without having recourse to the value of y just obtained.

Attraction of Solids. PLATE L. Fig. 1.

Let $AB = a$, (Fig. 1.) $AC = z$, and the angle $BAC = \varphi$. Then $AE = AC \times \cos.\varphi = z \cos.\varphi$, and so $a^2 z \cos.\varphi = z^3$, or $a^2 \cos.\varphi = z^2$; hence $z = a\sqrt{\cos.\varphi}$.

From this formula a value of AC or z may be found, if φ or the angle BAC be given; and if it be required to find z in numbers, it may be conveniently calculated from this expression. A geometrical construction may also be easily derived from it. For if with the radius AB, a circle BFH be described from the centre A; if AC be produced to meet the circumference in F, and if FG be drawn at right angles to AB, then $\frac{AG}{AB} = \cos.\varphi$, and so $z = a \times \sqrt{\frac{AG}{AB}} = \sqrt{AB \times AG} = AC$.

Therefore, if from the centre A, with the distance AB, a circle BFL be described, and if a circle be also described on the diameter AB, as AKB, then drawing any line AF from A, meeting the circle BFH in F, and from F letting fall FG perpendicular on AB, intersecting the semicircle AKB in K; if AK be joined, and AC made equal to AK, the point C is in the curve.

For $AK = \sqrt{AB \times AG}$, from the nature of the semicircle, and therefore $AC = \sqrt{AB \times AG}$, which has been shewn to be a property of the curve. In this way, any number of points of the curve may be determined; and the *solid of greatest attraction* will be described, as already explained, by the revolution of this curve about the axis AB.

Prop. III. Fig. 2.

To find the area of the curve ACB.

1. Let ACE, AFG (Fig. 2.) be two radii, indefinitely near to one another, meeting the curve ACB in C and F, and the circle described with the radius AB, in E and G. Let $AC = z$ as before, the angle $BAC = \varphi$, and $AB = a$. Then $GE = a\dot{\varphi}$, and the area $AGE = \frac{1}{2} a^2 \dot{\varphi}$, and since $AE^2 : AC^2 ::$ Sect. AEG : Sect. ACF, the sector $ACF = \frac{1}{2} z^2 \dot{\varphi}$. But $z^2 = a^2 \cos.\varphi$, (Prop. II.) whence the sector ACF, or the fluxion of the area $ABC = \frac{1}{2} a^2 \dot{\varphi} \cos.\varphi$, and consequently the area $ABC = \frac{1}{2} a^2 \sin.\varphi$, to which no constant quantity need be added, because it vanishes when $\varphi = 0$, or when the area ABC vanishes.

The whole area of the curve, therefore, is $\frac{1}{2} a^2$, or $\frac{1}{2} AB^2$; for when φ is a right angle, $\sin.\varphi = 1$. Hence the area of the curve on both sides of AB is equal to the square of AB.

2. The value of x when y is a maximum, is easily found. For when y, and therefore y^2 is a maximum, $\frac{2}{3} a^{\frac{4}{3}} x^{-\frac{1}{3}} = 2x$, or $3 x^{\frac{4}{3}} = a^{\frac{4}{3}}$, that is $x = \frac{a}{3^{\frac{3}{4}}} = \frac{a}{\sqrt[4]{27}}$.

Hence, calling b the value of y when a maximum,

$$b^2 = a^{\frac{4}{3}} \times \frac{a^{\frac{2}{3}}}{27^{\frac{1}{6}}} - \frac{a^2}{27^{\frac{1}{2}}} = a^2 \left(\frac{27^{\frac{1}{3}} - 1}{27^{\frac{1}{2}}} \right) = \frac{2a^2}{\sqrt{27}}, \text{ and so } b = a\frac{\sqrt{2}}{\sqrt[4]{27}},$$

and therefore $a : b :: \sqrt[4]{27} : \sqrt{2}$, or as $11 : 7$ nearly.

3. It is material to observe, that the radius of curvature at A is infinite. For since $y^2 = a^{\frac{4}{3}} x^{\frac{2}{3}} - x^2$,

$\frac{y^2}{x}=\frac{a^{\frac{4}{3}}}{x^{\frac{1}{3}}}-x$. But when x is very small, or y indefinitely near to A, $\frac{y^2}{x}$ becomes the diameter of the circle having the same curvature with ACB at A, and when x vanishes, this value of $\frac{y^2}{x}$, or $\frac{a^{\frac{4}{3}}}{x^{\frac{1}{3}}}-x$, becomes infinite, because of the divisor $x^{\frac{1}{3}}$ being in that case $=0$. The diameter, therefore, and the radius of curvature at A are infinite. In other words, no circle, having its centre in AB produced, and passing through A, can be described with so great a radius, but that, at the point A, it will be within the curve of equal attraction.

The solid of greatest attraction, then, at the extremity of its axis, where the attracted particle is placed, is exceedingly flat, approaching more nearly to a plane than the superficies of any sphere can do, however great its radius.

4. To find the radius of curvature at B, the other extremity of the axis, since $y^2=a^{\frac{4}{3}}x^{\frac{2}{3}}-x^2$, if we divide by $a-x$, we have $\frac{y^2}{a-x}=\frac{a^{\frac{4}{3}}x^{\frac{2}{3}}-x^2}{a-x}$. But at B, when $a-x$, or the abscissa reckoned from B vanishes, $\frac{y^2}{a-x}$ is the diameter of the circle having the same curvature with ACB in B. But when $a-x=0$, or $a=x$, both the numerator and denominator of the fraction $\frac{a^{\frac{4}{3}}x^{\frac{2}{3}}-x^2}{a-x}$ vanish, so that its ultimate value does not appear. To remove this difficulty, let $a-x=z$, or $x=a-z$, then we have $y^2=a^{\frac{4}{3}}(a-z)^{\frac{2}{3}}-(a-z)^2$. But when z is extremely small, its powers, higher than the first, may be rejected; and therefore $(a-z)^{\frac{2}{3}}=a^{\frac{2}{3}}\left(1-\frac{z}{a}\right)^{\frac{2}{3}}=a^{\frac{2}{3}}(1-\frac{2z}{3a}$, &c.) Therefore the equation to the curve becomes, in this case, $y^2=a^{\frac{4}{3}}\times a^{\frac{2}{3}}\left(1-\frac{2z}{3a}\right)-a^2+2az=a^2-\frac{2}{3}az-a^2+2az=\frac{4}{3}az$.

Hence $\frac{y^2}{2z}$, or the radius of curvature at $B=\frac{2}{3}a$. The curve, therefore, at B falls wholly without the circle BKA, described on the diameter AB, as its radius of curvature is greater. This is also evident from the construction. Fig. 1.

Prop. IV. To find the force with which the solid above defined attracts the particle A in the direction AB.

Plate L. Fig. 2. Let b (Fig. 2.) be a point indefinitely near to B, and let the curve Acb be described similar to ACB. Through C draw CcD perpendicular to AB, and suppose the figure thus constructed to revolve about AB; then each of the curves ACB, Acb will generate a solid of greatest attraction; and the excess of the one of these solids above the other, will be an indefinitely thin shell, the attraction of which is the variation of the attraction of the solid ACB, when it changes into Acb.

Again, by the line DC, when it revolves along with the rest of the figure about AB, a circle will be described; and by the part Cc, a circular ring, on which, if we suppose a solid of indefinitely small altitude to be constituted, it will make the element of the solid shell ACc. Now the attraction exerted by this circular ring upon A, will be the same as if all the matter of it were united in the point C, and the same, therefore, as if it were all united in B.

But the circular ring generated by Cc, is $=\pi(\mathrm{DC}^2-\mathrm{D}c^2)=2\pi\,\mathrm{DC}\times\mathrm{C}c$. Now $2\,\mathrm{DC}\times\mathrm{C}c$ is the variation of y^2, or DC², while DC passes into Dc, and the curve BCA into the curve bcA; that is $2\,\mathrm{DC}\times\mathrm{C}c$ is the fluxion of y^2, or of $a^{\frac{4}{3}}x^{\frac{2}{3}}-x^2$, taken on the supposition that x is constant and a variable, viz. $\frac{4}{3}a^{\frac{1}{3}}\dot{a}\times x^{\frac{2}{3}}$. Therefore the space generated by $\mathrm{C}c=\frac{4\pi}{3}a^{\frac{1}{3}}x^{\frac{2}{3}}\dot{a}$.

If this expression be multiplied by $\dot{x}$, we have the element of the shell $=\frac{4\pi}{3}a^{\frac{1}{3}}x^{\frac{2}{3}}\dot{a}\dot{x}$.

In order to have the solidity of the shell ACBbc, the above expression must be integrated relatively to x, that is, supposing only x variable, and it is then $\frac{3}{5}\times\frac{4\pi}{3}a^{\frac{1}{3}}x^{\frac{5}{3}}\dot{a}+\mathrm{C}$. But $\mathrm{C}=0$, because the fluent vanishes when x vanishes, therefore the portion of the shell $\mathrm{AC}c=\frac{4}{5}x^{\frac{5}{3}}a^{\frac{1}{3}}\dot{a}$, and when $x=a$, the whole shell $=\frac{4\pi}{5}a^2\dot{a}$.

Now, if the whole quantity of matter in the shell were united at B, its attractive force exerted on A, would be the same with that of the shell; therefore the whole force of the shell $=\frac{4\pi}{5}\dot{a}$. The same is true for every other indefinitely thin shell into which the solid may be supposed to be divided; and therefore the whole attraction of the solid is equal to $\frac{4\pi}{5}\dot{a}$, supposing a variable, that is $=\frac{4\pi}{5}a$.

Hence we may compare the attraction of this solid with that of a sphere of which the axis is AB, for the attraction of that sphere $=\frac{\pi}{6}a^3\times\frac{4}{a^2}=\frac{2\pi}{3}a$. The attraction of the solid ADBH, (Fig. 1.) is, therefore, to that of the sphere on the same axis as $\frac{4\pi}{5}a$ to $\frac{2\pi}{3}a$, or as 6 to 5. Plat Fig. 1

To find the content of the solid ADBH, we need only integrate the fluxionary expression for the content of the shell, viz. $\frac{4\pi}{5}a^2\dot{a}$. We have then $\frac{4\pi}{15}a^3=$ the content of the solid ADBH. Since the solidity of the sphere on the axis a is $=\frac{\pi}{6}a^3$, the content of the solid ADBH is to that of the sphere on the same axis as $\frac{4\pi}{15}a^3$ to $\frac{\pi}{6}a^3$; that is, as $\frac{4}{15}$ to $\frac{1}{6}$, or as 8 to 5.

V. It has been supposed in the preceding investigation, that the particle on which the solid of greatest attraction exerts its force is in contact with that solid. Let it now be supposed, that the distance between the solid and the particle is given; the solid being on one side of a plane, and the particle at a given distance from the same plane on the opposite side. The mass of matter which is to compose the solid being given, it is required to construct the solid.

ɛ L. Let the particle to be attracted be at A (Fig. 3.), from A draw AA′ perpendicular to the given plane, and let EF be any straight line in that plane, drawn through the point A′; it is evident that the axis of the solid required must be in AA′ produced. Let B be the vertex of the solid, then it will be demonstrated, as has been done above, that this solid is generated by the revolution of the curve of *equal attraction*, (that of which the equation is $y^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2$), about the axis of which one extremity is at A, and of which the length must be found from the quantity of matter in the solid.

The solid required, then, is a segment of the solid of greatest attraction, having B for its vertex, and a circle, of which A′E or A′F is the radius, for its base.

To find the solid content of such a segment, CD being $= y$, and AC $= x$, we have $y^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2$, and $\pi y^2 \dot{x} = \pi a^{\frac{4}{3}}x^{\frac{2}{3}}\dot{x} - \pi x^2 \dot{x} =$ the cylinder, which is the element of the solid segment.

Therefore $\int \pi y^2 \dot{x}$, or the solid segment intercepted between B and D must be $\frac{3}{5}\pi a^{\frac{4}{3}}x^{\frac{5}{3}} - \frac{1}{3}\pi x^3 +$ C. This must vanish when $x = a$, or when C comes to B, and therefore C $= -\frac{4\pi}{15}a^3$. The segment, therefore, intercepted between B and C, the line AC being x, is $\frac{4\pi}{15}a^3 - \frac{3\pi}{5}a^{\frac{4}{3}}x^{\frac{5}{3}} + \frac{\pi}{3}x^3$.

This also gives $\frac{4\pi}{15}a^3$, for the content of the whole solid, when $x=0$, the same value that was found by another method at Prop. II.

Now, if we suppose x to be $=$ AA′, and to be given $= b$, the solid content of the segment becomes $\frac{4\pi}{15}a^3 - \frac{3}{5}\pi a^{\frac{4}{3}}b^{\frac{5}{3}} + \frac{\pi}{3}b^3$, which must be made equal to the given solidity, which we shall suppose $= m^3$, and from this equation a, which is yet unknown, is to be determined. If, then, for $a^{\frac{1}{3}}$ we put u, we have $\pi\left(\frac{4}{15}u^9 - \frac{3}{5}b^{\frac{5}{3}}u^4 + \frac{1}{8}b^3\right) = m^3$, or $\frac{4}{15}u^9 - \frac{3}{5}b^{\frac{5}{3}}u^4 = \frac{m^3}{\pi} - \frac{1}{3}b^3$ and $u^9 - \frac{9}{4}b^{\frac{5}{3}}u = \frac{15m^3}{4\pi} - \frac{15}{12}b^3$.

The simplest way of resolving this equation, would be by the rule of false position. In some particular cases, it may be resolved more easily; thus, if $\frac{15m^3}{\pi} - \frac{15}{12}b^3 = 0$, $u^9 - \frac{9}{4}b^{\frac{5}{3}}u^4 = 0$, and $u^5 = \frac{9}{4}b^{\frac{5}{3}}$, that is $a^{\frac{5}{3}} = \frac{9}{4}b^{\frac{5}{3}}$ or $a = b \times \left(\frac{9}{4}\right)^{\frac{3}{5}} = b\sqrt[5]{\frac{729}{64}}$.

Prop. VI. 1. If it be required to find the equation to the superficies of the solid of greatest attraction, and also to the sections of it parallel to any plane passing through the axis; this can readily be done by help of what has been demonstrated above.

Plate L. Fig. 4. Let AHB (Fig. 4.) be a section of the solid, by a plane through AB its axis. Let G be any point in the superficies of the solid, GF a perpendicular from G on the plane AHB, and FE a perpendicular from F on the axis. Let AE $= x$, EF $= z$, FG $= v$, then x, z, and v are the three co-ordinates by which the superficies is to be defined. Let AB $= a$, EH $= y$, then, from the nature of the curve AHB, $y^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2$. But because the plane GEH is at right angles to AB, G and H are in the circumference of a circle of which E is the centre; so that GE $=$ EH $= y$. Therefore EF² + FG² = EH², that is, $z^2 + v^2 = y^2$, and by substitution for y^2 in the former equation, $z^2 + v^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2$, or $(x^2 + z^2 + v^2)^3 = a^4 x^2$, which is the equation to the superficies of the solid of greatest attraction.

2. If we suppose EF, that is z, to be given $= b$, and the solid to be cut by a plane through FG and CD, (CD being parallel to AB), making on the surface of the solid the section DGC; and if AK be drawn at right angles to AB, meeting DC in K, then we have, by writing b for z in either the preceding equations, $b^2 + v^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2$, and $v^2 = a^{\frac{4}{3}}x^{\frac{2}{3}} - x^2 - b^2$ for the equation of the curve DGC, the co-ordinates being GF and FK, because FK is equal to AE or x.

This equation also belongs to a curve of equal attraction; the plane in which that curve is being parallel to AB, the line in which the attraction is estimated, and distant from it by the space b.

Instead of reckoning the abscissa from K, it may be made to begin at C. If AL or CK $= h$, then the value of h is determined from the equation $b^2 = a^{\frac{4}{3}}h^{\frac{2}{3}} - h^2$, and if $x = h + u$, u being put for CF, $v^2 = a^{\frac{4}{3}}(h+u)^{\frac{2}{3}} - (h+u)^2 - a^{\frac{4}{3}}h^{\frac{2}{3}} + h^2$, or $v^2 + (h+u)^2 + b^2 = a^{\frac{4}{3}}(h+u)^{\frac{2}{3}}$, or $(v^2 + (h+u)^2 + b^2)^3 = a^4(h+u)^2$.

When b is equal to the maximum value of the ordinate EH, (Prop. III. 2.) the curve CGD goes away into a point; and if b be supposed greater than this, the equation to the curve is impossible.

The solid of greatest attraction may be found, and it properties investigated, in the way that has now been exemplified, whatever be the law of the attracting force. It will be sufficient, in any case, to find the equation of the generating curve, or the curve of equal attraction.

Fig. 1. Thus, if the attraction which the particle C (Fig. 1.) exerts on the given particle at A, be inversely as the

m power of the distance, or as $\frac{1}{\mathrm{AC}^m}$, then the attraction in the direction AE will be $\frac{\mathrm{AE}}{\mathrm{AC}^{m+1}}$, and if we make this $= \frac{1}{\mathrm{AB}^m}$, we have $\frac{\mathrm{AE}}{\mathrm{AC}^{m+1}} = \frac{1}{\mathrm{AB}^m}$, or making $\mathrm{AE} = x$, $\mathrm{EC} = y$, and $\mathrm{AB} = a$, as before, $\frac{x}{(x^2+y^2)^{\frac{m+1}{2}}} = \frac{1}{a^m}$, or $a^m x = (x^2+y^2)^{\frac{m+1}{2}}$, and $x^2 + y^2 = a^{\frac{2m}{m+1}} x^{\frac{2}{m+1}}$, or $y^2 = a^{\frac{2m}{m+1}} x^{\frac{2}{m+1}} - x^2$.

If $m=1$, or $m+1=2$, this equation becomes $y^2 = ax - x^2$, being that of a circle of which the diameter is AB. If, therefore, the attracting force were inversely as the distance, the solid of greatest attraction would be a sphere.

If the force be inversely as the cube of the distance, or $m=3$, and $m+1=4$, the equation is $y^2 = a^{\frac{3}{2}} x^{\frac{1}{2}} - x^2$, which belongs to a line of the 4th order.

If $m=4$, and $m+1=5$, the equation is $y^2 = a^{\frac{8}{5}} x^{\frac{2}{5}} - x^2$; which belongs to a line of the 10th order.

In general, if m be an even number, the order of the curve is $\overline{m+1} \times 2$; but if m be an odd number, it is $m+1$ simply.

Prop. VII. In considering the attraction of mountains in such a manner as to make a due allowance for the heterogeneity of the mass, it is necessary to determine the attraction of a half cylinder, or of any sector of a cylinder, on a point situated in its axis, in a given direction, at right angles to that axis. The solution of this problem is much connected with the experimental inquiries concerning the attraction of mountains, and affords examples of maxima of the kind that form the principal object of this paper. The following lemma is necessary to the solution.

Plate L. Fig. 5. Let the quadrilateral DG (Fig. 5.) be the indefinitely small base of a column DH, which has every where the same section, and is perpendicular to its base DG.

Lemma. Let A be a point at a given distance from D, in the plane DG; it is required to find the force with which the column DH attracts a particle at A, in the direction AD.

Let the distance $\mathrm{AD} = r$, the angle $\mathrm{DAE} = \varphi$, DE (supposed variable) $= y$, and let EF be a section of the solid parallel, and equal to the base DG; and let the area of $\mathrm{DG} = m^2$.

The element of the solid DF is $m^2 \dot{y}$; and since DE, or $y = r \tan.\varphi$, $\dot{y} = r\, \dot{\overline{\tan.\varphi}} = r.\frac{\dot{\varphi}}{\cos.\varphi^2}$, so that the element of the solid $= m^2 r.\frac{\dot{\varphi}}{\cos.\varphi^2}$.

This quantity divided by AE^2, that is, since AE : AD : : 1 : cos. φ, by $\frac{r^2}{\cos.\varphi^2}$, gives the element of the attraction in the direction AE equal to $\frac{m^2 r \dot{\varphi}}{\cos.\varphi^2} \times \frac{\cos.\varphi^2}{r^2} = \frac{m^2 \dot{\varphi}}{r}$. To reduce this to the direction AD, it must be multiplied into the cosine of the angle DAE or φ, so that the element of the attraction of the column in the direction AD is $\frac{m^2}{r} \dot{\varphi} \cos.\varphi$, and the attraction itself $= \frac{m^2}{r} \int \dot{\varphi} \cos.\varphi = \frac{m^2}{r} \sin.\varphi$.

When φ becomes equal to the whole angle subtended by the column, the total attraction is equal to the area of the base divided by the distance, and multiplied by the sine of the angle of elevation of the column.

If the angle of elevation be 30°, the attraction of the column is just half the attraction it would have, supposing it extended to an infinite height.

In this investigation, m^2 is supposed an infinitesimal; but if it be of a finite magnitude, provided it be small, this theorem will afford a sufficient approximation to the attraction of the column, supposing the distance AD to be measured from the centre of gravity of the base, and the angle φ to be that which is subtended by the axis of the column, or by its perpendicular height above the base.

Prop. Plat Fig. 6. Let the semicircle CBG (Fig. 6.), having the centre A, be the base of a half cylinder standing perpendicular to the horizon, AB a line in the plane of the base, bisecting the semicircle, and representing the direction of the meridian; it is required to find the force with which the cylinder attracts a particle at A, in the direction AB, supposing the radius of the base and the altitude of the cylinder to be given.

Let DF be an indefinitely small quadrilateral, contained between two arches of circles described from the centre A, and two radii drawn to A; and let a column stand on it of the same height with the half cylinder, of which the base is the semicircle CBG. Let $z =$ the angle BAD, the azimuth of D; $v =$ the vertical angle subtended by the column on DF; $a =$ the height of that column, or of the cylinder, $\mathrm{AD} = x$, AB, the radius of the base, $= r$.

By the last proposition, the column standing on DF, exerts on A an attraction in the direction AD, which is $= \frac{\mathrm{D}d \times \mathrm{D}f}{\mathrm{AD}} \times \sin.v$.

Now $\mathrm{D}d = \dot{x}$, $\mathrm{D}f = x\dot{z}$, and $\mathrm{D}d \times \mathrm{D}f = x\dot{z}\dot{x}$. Therefore the attraction in the direction AD is $\frac{x\dot{x}\dot{z}}{x} \times \sin.v = \dot{x}\dot{z} \sin.v$, and reduced to the direction AB, it is $\dot{x}\dot{z} \sin.v \times \cos.z$.

This is the element of the attraction of the cylindric shell or ring, of which the radius is AD or x, and the thickness $\dot{x}$; and therefore integrated on the supposition that z only is variable, and x and v constant, it gives $\dot{x} \sin.v \int \dot{z} \cos.z = \dot{x} \sin.v \times \sin.z$ for the attraction of the shell. When $z=90$, and $\sin.z=1$, we have the attraction of a quadrant of the shell $= \dot{x} \sin.v$, and therefore that of the whole semicircle $= 2\dot{x} \sin.v$.

Next, if x be made variable, and consequently v, we have $2\int \dot{x} \sin.v$ for the attraction of the semicylinder, Now the angle v would have a for its sine if the radius were $\sqrt{a^2+x^2}$, and so sin. $v=\frac{a}{\sqrt{a^2+x^2}}$; wherefore the above expression is $\int\frac{2a\dot{x}}{\sqrt{a^2+x^2}}=2a\,\mathrm{L}\,(x+\sqrt{a^2+x^2})+\mathrm{C}$; and as this must vanish when $x=0$, $2a\,\mathrm{L}\,a+\mathrm{C}=0$, and $\mathrm{C}=-2a\,\mathrm{L}\,a$, so that the fluent is $2a\,\mathrm{L}\frac{x+\sqrt{x^2+x^2}}{a}$, which, when $x=r$, gives the attraction of the semi-cylinder $=2a\,\mathrm{L}\frac{r+\sqrt{a^2+r^2}}{a}$; an expression very simple, and very convenient in calculation. It is probably needless to remark, that the logarithms meant are the hyperbolic.

The limits of our work will not permit us to give the other propositions which Mr Playfair has demonstrated. We shall endeavour, however, to present our readers with the results of his investigations.

1. The attraction of the solid of greatest attraction is to the attraction of a sphere of equal bulk as 81 to 79.

2. The cone which attracts a particle placed at its vertex with the greatest force, is formed by the revolution of a right angled triangle, the hypothenuse of which makes an angle of 31° 23′ with the axis of rotation; or the cone of greatest attraction has the radius of its base nearly double of its altitude. The attraction of a cone when a maximum, is about four-fifths of the attraction of a sphere of equal solidity.

3. A cylinder which exerts the greatest attraction on a particle at the extremity of its axis, when the radius of its base is to its altitude as $9-\sqrt{17}$ is to 8, or as 5 to 8 nearly. The attraction of a cylinder of the preceding form is to that of a sphere of the same solid content as 1218 to 1211.4.

4. A semi-cylinder exerts the greatest attraction upon a particle situated in the centre of its base, when the altitude of the semi-cylinder is to the radius of its base as 125 to 216.

5. If the oblateness of a spheroid diminish, while its quantity of matter remains the same, its attraction will increase till its oblateness vanish, and the spheroid become a sphere when the attraction at its poles becomes a maximum. If the polar axis continue to increase, the spheroid becomes oblong, and the attraction at the poles again diminishes.

6. The force with which a particle of matter is attracted by a parallelopiped, in a direction perpendicular to any of its sides, may be determined by the following rule. Multiply the sine of the greatest elevation into the sine of the greatest azimuth of the solid; the arch, of which this is the sine, multiplied into the thickness of the solid, is equal to its attraction in the direction of the perpendicular from the point attracted.

This rule will be understood from Fig. 7., where EM is the parallelopiped, having its thickness CE indefinitely small, A a particle situated without it, and AB a perpendicular to the plane CDMN. The greatest azimuth of the solid is the angle CAB, and its sine is $\frac{\mathrm{BC}}{\mathrm{AC}}$. The greatest elevation of the solid is the angle BAL, and its sine is $\frac{\mathrm{BL}}{\mathrm{AL}}$.

7. If a particle A gravitate to a rectangular plane, or to a solid indefinitely thin, contained between two parallel rectangular planes, its gravitation in the line perpendicular to those planes will be equal to the thickness of the solid multiplied into the area of the spherical quadrilateral, subtended by either of those planes at the centre A, or to the area of the spherical figure which the plane figure subtends at that distance.

8. An isosceles pyramid, with a square base, will attract a particle at its vertex with the greatest force, when the inclination of the opposite planes to one another is an angle of 153°.

9. The force F which a parallelopiped BF exerts upon a particle A, in a direction perpendicular to its sides, is $\mathrm{F}=\eta a-\eta' a'+\mathrm{BE.\,Log.}\frac{(\mathrm{AF}+\mathrm{FN})\mathrm{AE}}{(\mathrm{AD}+\mathrm{DE})\mathrm{AN}}+\mathrm{BC.\,Log.}\frac{(\mathrm{AF}+\mathrm{FM})\mathrm{AC}}{(\mathrm{AD}+\mathrm{DC})\mathrm{AM}}$; where η is the measure of the angular space, subtended at A by the rectangle BD, and η' the angular space subtended by the rectangle RF; and $\mathrm{AB}=a$, and $\mathrm{AK}=a'$. Fig. 8.

"This investigation," says Mr Playfair, "points at the method of finding the figure which a fluid, whether elastic or unelastic, would assume, if it surrounded a cubical or prismatic body by which it was attracted. It gives some hopes of being able to determine generally the attraction of solids bounded by any plane whatever; so that it may some time or other be of use in the theory of crystallisation, if indeed that theory shall ever be placed on its true basis, and founded not on an hypothesis purely geometrical, or in some measure arbitrary, but on the known principles of dynamics."—The demonstration of the preceding important results will be found in the *Transactions of the Royal Society of Edinburgh*, vol. vi. p. 187. (*o*)

ATTRACTION AND REPULSION OF FLOATING BODIES. See FLOATING *Bodies*.

ATTRIBUTES. See LOGIC, GOD, and THEOLOGY.

ATTRITION. See FRICTION and MECHANICS.

ATWOOD, GEORGE, F. R. S. a celebrated mathematician, and natural philosopher, was born in the year 1745. After receiving his education at Westminster-school, he went to Cambridge, where he was for some time a tutor, and afterwards a fellow of Trinity college. The lectures on experimental philosophy which he read to the university were much admired; and it was on this occasion that Mr Atwood attracted the attention of Mr Pitt, who happened to be one of his auditors. When this statesman came into power, he conferred a sinecure office upon Mr Atwood in 1781, and employed him in all his financial calculations. Mr Atwood invented a very ingenious machine for exhibiting the phenomena of accelerated and retarded motion, and for ascertaining in a simple manner the quantity of matter moved, the moving force, the space described, the time of description, and the velocity acquired. It may be employed also in estimating the velocities communi-

Ava
||
Avalanches.

cated by the percussion of elastic and non-elastic bodies, for determining the resistance of fluids, and for confirming the properties of rotatory motion. His principal works are his *Description of Experiments;* his *Analysis of a Course of Lectures;* his *Treatise on Rectilineal and Rotatory Motion;* his *Treatise on Arches*, 1801; and his *Disquisition on the Stability of Ships*, in the *Phil. Trans.* for 1798.

Mr Atwood was honoured with the Copley medal for his valuable papers in the Transactions of the Royal Society. He died in London on the 11th July 1807, in the 62d year of his age, and was interred in St Margaret's church, Westminster. (*j*)

AVA, KINGDOM OF. See BIRMAN EMPIRE.

AVA, or AUNGWA, the name of the ancient capital of the Birman empire, which has been gradually falling into decay since the new capital Ummerapoora was founded. Ava is situated on the banks of the river Irrawaddy, and was divided into an upper and a lower city. The former was about four miles in circuit, and was protected with a deep ditch and a wall 30 feet high. The latter was only about a mile in circumference, but was much stronger than the lower city. Dilapidated temples, roofless houses, and streets covered with rank grass and bushes, form a striking contrast with the rising city of Ummerapoora. See Syme's *Embassy to Ava*, vol. ii. p. 270.; and Rennel's *Memoir*, p. 297. See also BIRMAN EMPIRE, and UMMERAPOORA. (*w*)

AVAL, or AUAL, one of the Bahrin islands on the western side of the Persian Gulf. It is about 30 miles long and 12 broad, and contains, besides the fortified town of Bahrin, about 60 poor villages. Dates are produced in the island in great abundance; and the best pearls are obtained from its pearl fishery. The duty upon these articles amounts to a lack of rupees. The inhabitants of Aval are Arabs of the Chia persuasion. E. Long. 48° 56′, N. Lat. 26° 45′. See BAHRIN. (*j*)

AVALANCHES, the name given to those immense masses of snow which are precipitated from the Alps, and which often overwhelm whole villages in their destructive course. When the snow begins to melt by the heat of summer, the water which is produced runs below, and destroys the adhesion between the snow and the earth, and a new snow sometimes falling upon the older mass, increases its weight and determines its fall. These masses are often detached by the impulse of the wind; and the inhabitants of the Alps are so convinced that the least sound will produce their fall, that they take off the bells from their mules; and when the avalanches are too slow in falling at places where they are precipitated annually, the inhabitants endeavour to accelerate their fall by the report of their muskets. These avalanches sometimes occasion dreadful hurricanes. In the winter of 1769, 1770, an avalanche produced by the immense quantity of snow which had fallen, rolled down upon the pastures on the mountain of Sixt in the Alps. The impulse which was given to the air by the fall of this huge mass was so dreadful, that it levelled with the ground a forest of beeches and firs, which covered the declivity of the mountain, stopped the course of the river Gipre which runs through the subjacent valley, and overthrew a number of trees and barns on the opposite shore of the stream.

"The snow which falls above the superior limit of congelation," says Mr Leslie, "from its powdery and incohesive quality, is incapable of much accumulation: loosened by the impression of the sun, it slides down, and, gathering force in its descent, it often precipitates itself in those dangerous *avalanches*. But I consider glaciers themselves as formed only by avalanches of a rarer and more formidable kind. The icy zone will accumulate till its weight at last overcomes its cohesion; then giving way, it will rush down the side of the mountain with irresistible sweep, and spread its shivered fragments. This statement agrees with the phenomena, and explains the reason why glaciers are not observed among the Andes." *Experimental Inquiry*, &c. note xxv. p. 537, 540. See GLACIER. (*o*)

AVARS, AVARES, or AVARI, a name denoting "far distant," was formerly applied to the inhabitants of the more remote districts of Asiatic Sarmatia, towards the east; but is now chiefly confined to a horde of barbarians belonging to the nation of the Ogors or Varchonites, who, about the middle of the sixth century, when resisting an invasion of the Turks, were defeated with the loss of their king, and 300,000 of his subjects. A few, preferring exile to servitude, wandered towards the south in quest of new settlements. Their very name inspired terror into the nations through which they passed, and tracing the course of the Volga, they stopped not till they had pitched their tents at the foot of mount Caucasus. Here they first heard of the rich kingdoms of the West, and dispatching ambassadors to Constantinople, they proffered their services in defence of the empire, and relying on the terror of their name, demanded as their reward, "precious gifts, annual subsidies, and fruitful possessions."—"The whole city," says Gibbon, "was poured forth to behold with curiosity and terror, the aspect of a strange people; their long hair, which hung in tresses down their backs, was gracefully bound with ribbons, but the rest of their habit appeared to imitate the fashion of the Huns." The emperor Justinian, worn out with age, and the exertions of an arduous reign, preferred inglorious peace to a doubtful war. He received the Avars as friends and subsidiaries; and directed their arms against the enemies of Rome. With savage fury, they over-ran Germany and Poland. The banks of the Danube, and of the Elbe, were alternately covered with their tents, and many of the conquered tribes were confounded under the name and standard of the Avars. Their power was now established in Europe, and, from being the friends and allies of the Romans, they became their most determined foes. The emperor had transferred his friendship to the Turks, who, pursuing the footsteps of the vanquished Ogors, had appeared in the empire, and branded the Avars with the title of fugitives and rebels. Their embassy was now received with coldness by Justinian II.; their threats were disregarded, and their ambassadors dismissed with haughty defiance. Dreading, probably, to meet the Romans in alliance with their ancient conquerors, the Avars dissembled their resentment, but remembered the insult. Leaguing with the Lombards, they extirpated the nation of the Gepidæ, and received as the price of their alliance the country of Dacia, comprehending the fertile provinces of Wallachia, Moldavia, and Transylvania. Here they erected an empire, which subsisted with splendour for upwards of 230 years. By the departure of the Lombards for Italy, the Avars became masters of their extensive possessions; and at the beginning of the seventh century, the dominions of Baian, their chagan or king, extended from the mouth of the Danube to that of the Oder. In the plains of Hungary, he occupied the rustic palace of Attila, whose character and policy he seems to have imitated. From avarice or caprice, he harassed the empire by desolating incursions, or repeated demands of costly presents. After every inroad, the annual subsidy or tribute was increased; and he retaliated upon the successors of Justinian the insult which had been formerly offered to his countrymen. The emperor Maurice could no longer brook the insolence of the chagan, and determined to meet the barbarian in arms. In five successive battles Priscus the Roman general was victorious; 17,200 Avars were taken prisoners, and 60,000, with four sons of the chagan, fell in the field. But Priscus was not allowed to follow up his success, being recalled to defend the capital of the empire. Baian now directed his steps to the fertile plains of Italy. Murder and rapine were the attendants of his march. The rights of victory were abused, and the laws of nations violated with the most wanton brutality. His captives were either slain, or reduced to servitude, and the noblest virgins were abandoned to the promiscuous lust of his barbarous followers. Unsated with blood and plunder, the Avars returned to their predatory warfare in Thrace. The emperor Heraclius attempted to buy their friendship with intreaties and 200,000 pieces of gold, but the perfidious chagan dissembled his design, and after a fruitless attempt to surprise and take Heraclius prisoner, he entered into an alliance with Chosroes king of Persia, and threatened to annihilate the empire of the East. Constantinople was invested by 110,000 barbarians under the command of the chagan, A. D. 626. During ten successive days the assault was repeated, but a scarcity of provisions, and the determined resistance of the inhabitants, compelled the Avars to retire; and the empire was rescued from impending ruin, by the alliance of the Turks, and the bravery of Heraclius. These barbarians, however, still continued to be the scourge and terror of the surrounding nations. About the end of the 8th century, they resisted, for a time, with persevering courage and resolution, the mighty power of Charlemagne, but were at last defeated in a general engagement by Henry duke of Friuli, who took their capital Ringa, after an obstinate defence, and carried off immense treasures, the plunder of the neighbouring countries, which they had been amassing for ages. Their reduction was completed by Pepin king of Italy, who killed the chagan in battle, and put an end to the war. The remainder of this people, under their leader Thaudin, submitted to Charlemagne, were baptised, and received into his protection.

A nation of Avars inheriting the bravery of their ancestors, exists at this day in the mountains of Daghestan. Living in tents, and wandering from place to place, they have maintained their independence in spite of the repeated attacks of the neighbouring princes, who have often attempted to subdue them. See Gibbon's *Hist.* vol. vii. p. 261; and viii. p. 176, &c. *Mod. Un. Hist.* vol. xxiii. p. 148. (*p*)

AVATSCHA, or AWATSKA, called also *St Peter* and *St Paul*, a sea-port of Kamtschatka. It is situated upon a tongue of land, which, like an artificial bank, forms behind the town a harbour enclosed like a circle; which, during winter, might accommodate three or four dismantled ships. It was proposed by M. Kasloff, the governor, to mark out on the side of this bason the plan of a town, destined to be the capital of Kamtschatka, and perhaps the grand centre of commerce with China, Japan, the Philippines, and America. The bay of Avatscha, which was visited both by Captain Cooke and La Perouse, is represented as the most commodious and safest for shipping in the world. It has excellent holding ground, and its mouth is so narrow, that it could easily be protected by a fort. Two vast harbours, one on the east, and the other on the western coast, could contain all the ships of England and France. E. Long. 158° 48′, N. Lat. 52° 51′. See La Perouse's *Voyage*, vol. ii. ch. xxii. p. 117, &c.; and the Continuation of Cooke's *Voyages*. (*p*)

AUBAINE, the name of the right by which the French king inherited the property of every foreigner that died within his dominions. As the Scots, the Swiss, the Savoyards, and the Portuguese, were reckoned natives of the kingdom, they were exempted from the effects of this oppressive and unhospitable custom. See Robertson's *Hist. Charles V.* vol. i. p. 377; and Muratori *Annali d'Italia*, vol. ii. p. 14. (*π*)

AUBE, the name of one of the departments of France, which derives its name from the river Aube, which waters it. It is bounded on the north by the department of the Marne, on the west by that of the Seine and the Marne, and by that of the Yonne; on the south, by the same departments and that of the Cote d'Or; and on the east by that of the higher Marne. The quarter of this department to the west of Troyes has received the name of *La Champagne Pouilleuse*, from its extreme sterility. The southern part of it is, on the contrary, very fertile, and produces abundance of grain and fruits. It contains 1,196,370 square acres. The forests occupy other 85 thousand hectares, which are divided equally among the nation, the communes, and individuals. Contributions in the year 1803, 2,508,574 francs. Population 240,661. Troyes is the capital of the department. (*o*)

AUBLETIA, a genus of plants, of the class Polyandria, and order Monogynia. See BOTANY. (*w*)

AUBONNE, the ALBONNA of the ancients, the name of a river, of a small town, and of a barony converted into a village in the Pays de Vaud, in Switzerland. The town, situated on the banks of the river, has the form of an amphitheatre, with a handsome castle at one end, which commands a view of the lake of Geneva, and the surrounding country. Aubonne is inconveniently situated for commerce with the neighbouring towns. It is celebrated for its fine views, and particularly for that which is seen from the place called the *Signal de Bougy*. Population 1200. E. Long. 6° 24′, N. Lat. 46° 29′. See *Dict. de la Suisse* vol. i. p. 22. (π)

AUCH, a city of France, and capital of the department of Gers, situated on a declivity of the hill near the river Gers. The streets, though narrow, are clean and well paved, and the town is adorned with several elegant modern buildings. The cathedral is a most magnificent structure, and the painted windows with which it is decorated, are remarkable for the brightness of their colours. Population 7696. Distance from Paris 147 leagues south-west. E. Long. 0° 35′, N. Lat. 43° 40′. (*o*)

AUBURN, or Albourne, a town of England, in Wiltshire, situated on a small river which runs into the Kennet. This town had formerly a considerable trade, but since the great fire in 1760, which destroyed 70 houses, it has fallen into decay. A considerable trade in fustians is carried on here; and in the neighbourhood there is an extensive rabbit warren, from which great numbers are sent to London. Number of houses 280. Population 1280. See Pennant's *Tour*. (*j*)

AUCKLAND, or Bishop's Auckland, a market and corporate town of England in Darlington ward, in the county of Durham. It derives its name from the number of oaks that formerly grew near it, and the word Bishop's was prefixed, from the Bishops of Durham being lords of the manor, and having a palace here. The town stands near the confluence of the rivers Wear and Wandless or Gaunless. The eminence on which it is situated is of an angular form, and is about 140 feet above the level of the plain below. There is here a large manufactory for printing cotton, muslins, and calicoes. Number of houses 408. Population 1961, of whom 331 are employed in trade. See Leland's *Itinerary*, vol. i.; and Hutchinson's *Hist. and Antiq. of the County of Durham*. (*o*)

AUCTION, a public sale, where every kind of property is sold to the highest bidder. The regulations respecting auctions, will be found in the statutes 27 G. II. cap. 13; 17 G. III. c. 50; 19 G. III. c. 56; 27 G. III. c. 13; 29 G. III. c. 63; 32 G. III. c. 41; 37 G. III. c. 14; 38 G. III. c. 54. (*j*)

AUCUBA, a genus of plants of the class Monœcia, and order Tetrandria. See Botany. (*w*)

AUDE, the name of one of the departments of France, which derives its name from the river Aude, which waters it. It is bounded on the north by the departments of Henault and Tarn; on the west, by those of the higher Garonne and the Arriege; on the south, by the Pyrenees; and, on the east, by the sea. The river Aude begins to become navigable when it is about to leave the department. At Narbonne it divides into two branches, one of which preserving the original name, loses itself in a marsh near the coast, while the other branch, under the name of Robine, terminates near Sigean. The soil of this department is naturally fertile, but ill cultivated. The honey, but particularly that which is got near Narbonne, is particularly celebrated. The department contains 1,275,593 square acres. The forests occupy 47 or 48 thousand hectares, more than the half of which belongs to the nation; 3000 hectares belong to the communes, and the rest to individuals. Contributions in the year 1803, 2,843,809 francs. Population 226,198. Carcasonne is the capital of the department. (*o*)

AUDIENCE, the name of the courts of justice established by the Spaniards in America. See Robertson's *Hist. of America*, vol. iii. p. 286. (*w*)

AVEBURY, or Abury, a small village of England, in the county of Wilts, is remarkable for the remains of a druidical temple, which has engaged the researches, and puzzled the conjectures, of our most learned antiquaries. It is situated about five miles west of Marlborough, and nineteen north of Stonehenge, and it claims our attention as being one of the most stupendous monuments of British antiquity which the island affords. From the tradition of the Welch bards we learn, that Avebury was one of the three primary *Gorseddau* or supreme seats of Britain; and the great national temple, or circle of convention of the ancient Britons. Here they assembled from all quarters of the island at their solemn festivals, which were held at the solstices and the equinoxes; and hither, it is supposed, that all (even from foreign countries) who wished to be perfectly skilled in druidical science, repaired for instruction. That this was the grand metropolitan station, is rendered most probable from its magnitude, the convenience of its situation, and the various British roads which converged to this spot; as also from the vast numbers of *tumuli* or barrows, and other relics of remote antiquity which are to be found in its neighbourhood. The temple consisted of large unhewn stones placed perpendicularly in the ground at nearly regular distances from each other, and disposed in parallel rows and circles. Most of these stones measured from ten to nineteen feet in height above the ground, forty feet in circumference, and weighed from forty to fifty-four tons each. The principal part of the temple was surrounded by a ditch and vallum about 30 feet in height, which embraced an area of 22 acres. Within this inclosure stood a large circle consisting of 100 stones, and including two double concentric circles, composed with 88 stones, and three others called the cove, with one called the central obelisk. From the large circle proceeded two avenues, extending about a mile in length each way, and consisting of 200 stones. The one towards the south-east, called the Kennet avenue, was terminated with two concentric oval arrangements of stones; and the other, the Beckhampton avenue, towards the west, had only a single stone at the extremity. The whole work is supposed to have originally consisted of 650 stones; but most of them have been thrown down, broken to pieces, and appropriated to other purposes, and a very few now remain in their original position. As a document of British antiquity, and a singular monument of ancient customs, the temple of Avebury deserves the attention of the antiquary and historian; and we cannot but regret the heedless industry of those who have laboured to destroy these venerable vestiges of former times. See Rees' *Cyclopædia*; and Britton's *Beauties of Wiltshire*, vol. iii. (*p*)

AVEIRO, or **Bragança Nova**, a sea-port town in the province of Beira, in Portugal, situated in a flat and marshy country, at the mouth of the Vouga. "The river Vouga," says Mr Link, "flows through the town, which is still very narrow, but is adorned with a handsome quay. Near the town it divides into two branches, one to the left and southward running to the sea, the other northward to Ovar. Its trade is inconsiderable, only small boats coming to the town, nor indeed could any but small ships pass the bar, which is continually shifting. The fishing alone is worthy of notice, for Aveiro chiefly supplies the province of Beira with sardinhas. Large troops of mules are continually seen carrying them into the higher parts of the province." Salt is also produced here in considerable quantities. Number of houses 1400. Population 4400. See Link's *Travels in Portugal*, chap. xxviii. p. 317. W. Long. 8° 38′ 45″, N. Lat. 40° 38′ 18″. (π)

AVELLINO, a town of Naples, situated in the Principato Ultra, or ulterior principality. It extends about a mile along the hollow of a hill, but is not remarkable either for good streets, or elegant public buildings. Cloth is manufactured here of various qualities and to a great extent. Wooden chairs, maccaroni, and paste of various kinds, are among the other articles of its trade. The soil of the surrounding country being chiefly volcanic, produces little corn. There is, however, abundance of fruit, and particularly nuts, which grow in great quantities, and which in good years produce an income of £11,250. The hazels are planted in rows, and are dressed and pruned with the greatest care. In September 1694, this town was nearly destroyed by an earthquake. Between Benevent and Avellino are the celebrated passes of the Val-di-Gargano, where the Romans were blocked up by the Samnites, A. U. 433, and compelled to pass under the yoke. Population 9000. E. Long. 14° 46′, N. Lat. 40° 54′. See Rollin's *Hist. Rom.* tom. iii. p. 252; and Swinburne's *Travels*, vol. i. p. 171. (π)

AVENA, a genus of plants of the class Triandria, and order Digynia. See Botany. (w)

AVENCHE, the *Aventicum* of the ancients, a small town in the canton of Berne, in Switzerland, situated at the south extremity of the lake Morat, near the river Broye. Avenche seems to have been a very flourishing colony in the time of the Romans. Within a space of about five miles in circumference, are discovered the foundations of walls, inscriptions, Mosaic pavements, medals, and numerous remains of architecture and sculpture in marble. A column of white marble about 60 feet high; the remains of an amphitheatre; the floor of an ancient bath, about 60 feet by 40, done in Mosaic work, and ornamented with numerous human figures, are some of the remains of its ancient magnificence. "Not far from these ruins," says Mr Coxe, "stands a column of white marble, about fifty feet in height, composed of large masses, nicely joined together without cement; near it lies a considerable fragment of defaced sculpture, which seems to have once formed part of the portal belonging to a magnificent temple. At a small distance from this column, in the high road, we observed a cornice of white marble, sculptured with urns and griffins; and as we walked through the town, we remarked several other masses of cornice, ornamented with sea-horses and urns, and some marble columns of beautiful proportions.

About a mile from Avenche, near the village of Coppet, on the other side of a little stream, which separates the canton of Firburgh from that of Bern, are the remains of a small aqueduct, discovered about fifteen years ago, by the accidental fall of a sand-hill. The outside is formed of stones and mortar, and the inside of red Roman cement; the vault of the arch may be about two feet and a half high, and one and a half broad. This aqueduct has been traced to the east side of the town, and near the marble column. We were also informed that it extends to the tower of Gausa, between Vevay and Lausanne, and that between Villarsel and Marnau, about four leagues from Coppet, an arch of nearly the same dimensions is excavated in the solid rock." The emperor Vespasian was one of the principal benefactors to this colony. In an inscription preserved in the church of Avenche, it is called *Colonia pia Flavia, constans emerita, Aventicum Helvetiorum fœderata*. E. Long. 7° 1′, N. Lat. 46° 52′. A description and engraving of the Mosaic pavement will be found in Schmidt's *Recueil d'Antiquites de la Suisse*. See also Coxe's *Travels in Switzerland*, vol. ii. p. 174—180; and *Dict. de la Suisse*, vol. i. p. 24. (o)

AVERNI, known also by the name of *Mephites*, are certain lakes, or other places, which infect the atmosphere with pestilential vapours. The most famous of these was the lake Avernus in Campania, celebrated by the ancients as the entrance into the infernal regions. It was supposed to be bottomless, and computed to be about two miles long, and one broad. Its depth, however, is now ascertained, which is in some places 188 feet. It is situated near Puzzuoli in the province of Terra di Lavora, and is called by the modern Italians Lago d'Averno, and Lago di Tripergola. Strabo describes it as lying within the Lucrine bay, and accessible only by a narrow passage. Its steep banks were covered with impervious groves, which excluded every ray of light; and such was the poisonous quality of its water, and the virulence of the vapours which it exhaled, that all birds which attempted to fly over it sunk down dead. A gloomy cave adjoining the lake is represented by Virgil as the habitation of the Cumæan Sibyl:

> *Spelunca alta fuit, vastoque immanis hiatu,*
> *Scrupea, tuta lacu nigro nemorumque tenebris:*
> *Quam super haud ullæ poterant impunè volantes*
> *Tendere iter pennis: talis sese halitus atris*
> *Faucibus effundens supera ad convexa ferebat;*
> *Unde locum Graii dixerunt nomine* Avernum.
>
> Virg. lib. vi. 236.

> Deep was the cave; and downward as it went
> From the wide mouth, a rocky rough descent;
> And here th' access a gloomy grove defends,
> And here th' innavigable lake extends.
> O'er whose unhappy waters, void of light,
> No bird presumes to steer his airy flight;
> Such deadly stenches from the depth arise,
> And steaming sulphur, that infects the skies.
> From hence the Grecian bards their legends make,
> And give the name *Avernus* to the lake.
>
> Dryden's *Virg.* vol. iii. p. 122.

Averrhoa, Averroes.

Here, at midnight, the trembling votaries of the Sibyl were supposed to celebrate her dismal orgies: costly sacrifices were offered to propitiate the favour of the infernal deities, and the secrets of futurity were drawn from the maddening tongue of the prophetess. This place continued to be the favourite haunt of superstition till the time of Augustus, who violated its sanctity, dissipated its poisonous exhalations, and dispelled the impenetrable darkness which enshrouded it. He cut down the surrounding wood, and connecting it with the Lucrine lake and the sea, he formed the Julian harbour, in which he exercised his fleet, during the winter, before he led it against Sextus Pompey. (*Suet. Aug.* 16.) From the present appearance of the lake, some have been inclined to suspect the ancients of exaggeration in their account of its malignant qualities. Spallanzani affirms, that neither the lake nor its environs afford any indication of noxious exhalations; while Mr Swinburne, on the contrary, thinks them entitled to more credit; and observes, that even now the air is feverish and dangerous, as the jaundiced faces of the vine-dressers who live in the neighbourhood most ruefully testify; and Boccacio relates, that, during his residence at the Neapolitan court, the surface of this lake was suddenly covered with dead fish, black and singed, as if killed by some subaqueous eruption of fire. The once poisonous Avernus, however, now presents a beautiful sheet of water, clear and serene, and abounds with fish and water-fowl.

Averni are very common in Hungary, on account of its numerous mines. In Italy, the Grotto del Cani is remarkable for its poisonous steams; and the valley of Soltafara, between the lakes Agnano and Puzzeli, derives its name from the vast quantities of sulphur which are continually forced out of its clefts by subterraneous fires. See Spallanzani's *Travels*, vol. i. p. 128, &c. Swinburne's *Travels*, vol. iii. p. 51. &c. (*p*)

AVERRHOA, a genus of plants of the class Decandria, and order Pentagynia. See Botany. (*w*)

AVERROES, (named by his countrymen Abual-Walid Mohammed, Ebn Achmed, Ebn Mohammed, Ebn Roshd,) the most admired of the Arabian philosophers, was born about the middle of the 12th century, at Cordova, a city of Andalusia, then the capital of the Moorish dominions in Spain. His father was the chief magistrate and supreme judge of the province, and also possessed the highest ecclesiastical authority. At an early period of life, Averröes devoted himself, with the greatest eagerness, to the study of mathematics, physic, law, and theology, and above all, to the philosophy of Aristotle, on whose writings, though unacquainted with the Greek language, he commented so successfully, that he not only was surnamed *Commentator*, κατ' ἐξοχὴν, but, in the estimation of many of his contemporaries, deserved a pre-eminence of praise superior to that of the Stagirite himself. For several ages, the scholastic disputants, of every possible variety of opinion, regarded his authority as oracular; but though he was in all cases appealed to with confidence by the contending parties, it does not appear that his Sibylline pages ever had the effect of terminating their contests, or ever contributed to soften the asperity with which their literary hostilities were conducted. He had acquired the talent of expressing himself with such ambidextrous felicity, that whenever his words had the appearance of being intelligible, it required little ingenuity to derive from them a profusion of arguments in support of either side of the question. To this artifice, the most judicious writers have ascribed his unparalleled reputation.

By the suffrages of his fellow-citizens, he was raised to the dignified offices which had been held by his father and grandfather, in the provinces of Andalusia and Valencia. So great at this time was his reputation, that he was chosen, by the caliph Jacob Al-Mansor, to fill a similar station in Morocco, and, in the mean while, he was permitted to nominate a deputy at Cordova; to which place he returned, after having appointed subordinate judges and magistrates, throughout the kingdom of Mauritania.

After being thus loaded with honours and distinction, he was destined to experience a most humiliating reverse of fortune. Having been persuaded to give lectures in philosophy to a number of young men, he incautiously advanced a variety of opinions, which could not easily be reconciled with the doctrines of the prophet. He was publicly accused of heresy, and condemned by the caliph to the severe punishment of degradation from his offices, confiscation of his whole property, and the infamy of residing in the suburbs of the city, among Jews and outcasts from the faith. After having for some time submitted with exemplary meekness to the multiplied indignities which were heaped on him by vulgar fanatics, whose bigotry was inflamed by the malice of his private enemies, he succeeded in effecting his escape to Fez; but there he was soon detected and committed to prison. For his temerity and presumption in attempting to escape from his ignominious doom, the judges and divines, commissioned by the king to deliberate on his case, sentenced him to a most mortifying penance, which was inflicted on him with unmitigated rigour. At the time of public prayers, the prisoner was conducted to the gate of the mosque, where, in the most submissive posture, with his head uncovered, he was exposed to the grossest insults from the meanest of the people, every one of whom had the privilege of testifying his abhorrence by spitting on the heretic's face. He then professed his contrition for his offences, and publicly recanted his errors. For some time afterwards he resided at Fez, and gave lectures on jurisprudence. He was then permitted to return to his native city, where he lived in a state of the lowest indigence, till a singular and unexpected occurrence restored him to his former honours. The person who had been promoted to the office which he had held in Morocco, became obnoxious to the people. They could not fail to compare the oppression under which they groaned, with the liberal conduct of Averröes. Reflecting on the equity and clemency of his administration, they were convinced that a more discerning and a more upright magistrate could never be expected; and under the influence of this conviction, they concurred in soliciting the caliph to reinstate the man who had long been the victim of persecution, and who at that moment was living in the most abject state of disgrace and wretchedness.

The prince, after consulting the leaders of the sacerdotal order, yielded to the petition of his subjects, and Averröes again emerged from obscurity to the honourable places which he had formerly held. During the remainder of his life, he resided at Morocco, where he died about the beginning of the 13th century, probably in 1206.

The natural dispositions of Averröes are described by almost all authors as having been superlatively amiable. As a judge, he acted with uniform impartiality, prudence and integrity, and with such gentleness and feeling, that when the laws required the punishment of death to be inflicted, he was never able to pronounce the sentence. Though born to an ample fortune, and though he enjoyed situations of great emolument, he was a pattern of frugality, moderation, and temperance. His liberality was unlimited, particularly to men of letters, whose circumstances did not enable them to gratify their inclination for study; and it was a favourite maxim of his, that wealth could never be better employed, than in converting enemies into friends. His patience and forgiveness of injuries deserve to be recorded. On a certain occasion, during a public lecture, one of his auditors went up to him, and whispered in his ear a most provoking insult. Not in the least disconcerted, the philosopher betrayed no emotion either of surprise or resentment, but merely signified, by an inclination of the head, that he had heard what was said to him. The circumstance would never have been known; but the person who had offered him the affront, was so astonished at his equanimity and forbearance, that he could not refrain from making an apology more public than the offence, and testifying that no retaliation could have mortified him so deeply as the superiority of mind evinced by Averröes.

His character as a philosopher would before this time have been forgotten, had not the extravagant encomiums of his admirers been transcribed by the historians of succeeding ages. His unbounded admiration of Aristotle is only one among many proofs of the defective erudition of the times in which he lived. The works of the Grecian philosopher and his commentators were the sole object of study, because scarcely any other writings worthy of perusal were known. These wonderful productions Averröes, who was ignorant of Greek, had no opportunity of examining, except through the medium of very incorrect translations into his native tongue; and he constantly displays an entire ignorance of the works of all other philosophers. He did not know the difference between Protagoras and Pythagoras; and the titles by which he refers to the works of Plato, are perfectly ludicrous. (*Lud. Viv.*) He is generally obscure, and full of contradictions; always abundantly dogmatical, and sometimes so arrogant, that we cannot help questioning the accounts which have descended to us of his urbanity and mildness. Among other subjects, he wrote on medicine, with the theory of which he is said to have been well acquainted; but it is remarkable, that though he often combated the opinions of his predecessor and rival Avicenna, he cautiously abstained from naming him. It is understood that he contributed to eradicate some medical prejudices. It had long been an undisputed maxim, that blood-letting, if practised before the fourteenth year, invariably proves fatal. Averröes ventured to bleed a child of his own not above seven years of age, who had been seized with an inflammation of the lungs, and the experiment, having terminated happily, demonstrated the fallacy of the opinion, by which physicians had hitherto been restrained from hazarding a method of cure which is obviously indicated by the symptoms of inflammatory diseases. The work which gained him the greatest credit was entitled *Destructiones Destructionum*, and was intended as a refutation of the errors of Algazel, who denied that the world is in any sense the work of God. This occasional defender of the faith, however, is accused of propagating heresies not less flagrant than those of Algazel. He maintained that there is only one understanding, absolutely the same, diffused among all the individuals of the human race. He rejected the Christian religion partly on account of the mystery of the eucharist, which he derided, (*quia Christiani gens stolidissima, Deum faciunt et comedunt;*) but his chief objection to our faith was, that it admits the creation of the world, which he pronounced an impossibility. He insisted that the divine providence cannot extend to individual objects. He believed that all spiritual existences have continued from eternity unchanged. He despised the Jewish religion as an assemblage of puerile observances; and Mahometanism he said was but a swinish faith, because it gave a free licence to sensual indulgences. He denied that there could be a future state of rewards and punishments. He has often been charged with atheism; not, however, we think with greater reason than there is to extend the accusation to Aristotle and the other philosophers who asserted the eternity of the world; an opinion which the ancients thought consistent with theism, but which both Christians and Mahometans have concurred in reprobating as atheistical. Erasmus speaks of him with great indignation, stigmatizing him by the severe epithets *impius* και τρις καταρατος. Petrarch was for some time engaged in preparing a confutation of his writings.

The understandings of Albertus, Scotus, and Aquinas, must have been singularly constituted; otherwise we cannot easily account for the avidity with which they gave their days and nights to the perusal and re-perusal of this self-contradictory author, and for that defect of perspicacity, or else that faculty of explaining things away, which saved them the horror of being shocked by the detection of his impieties.

Perhaps, however, Averröes may have been as much misrepresented by his Latin translators, as Aristotle was by the Arabian interpreters. The rabbins and schoolmen, who made his works known in Europe, were more remarkable for their zeal than for their ability; and the world is little indebted to them for the slovenly manner in which they executed their unprofitable task. See Leo Afric. *De Vir. illustr. apud Arab.* Lud. Vives *de Caus. Corrupt. Artium.* Cæl. Rhodigin. *Antiq. Lect.* Hottinger. *Bibl. Theolog.* D'Herbelot, *Bibl. Orient.* Bayle *Dict. Histor. et Crit.* (λ)

AVERSA, a town in the territory of Lavora, in the kingdom of Naples, built A. D. 1029, by Count Rainulf, the leader of the Normans. It was called Aversa, from its opposition to Capua, and from the aversion which Rainulf felt for Pandulph the prince of that city. The first asylum of the Normans in Italy, was a strong camp in the depth of the marshes of Campania, but by the liberality of the Duke of Naples, Aversa was built and fortified for their use, and they enjoyed all the luxuries of that fertile district. Distance from Naples eight miles. E. Long. 14° 9′, N. Lat. 40° 58′. See Gibbon's *Hist.* chap. lvi. vol. x. p. 232. ( )

AVESNES, a strong fortified town of France, situated on the river Hispre. Its fortifications were repaired by Vauban. Population 2935. E. Long. 3° 54′, N. Lat. 50° 8′. (w)

AVEYRON, the name of one of the departments of France, which derives its name from the river Aveyron, with which it is watered. It is bounded on the north by the department of Cantal; on the west, by that of Lot; on the south, by that of Tarn; and on the east, by that of the Gard and Lozere. There is little corn in this department; but the pastures are excellent, and there is plenty of wine and hemp. Besides these productions, there are mines of lead, iron, copper, alum, and coal; and several mineral springs. A considerable trade is carried on in cattle in this department. It contains 1,767,424 square acres. The forests, which belong chiefly to individuals, occupy 59 or 60 hectares. Contributions in 1803, 3,198,633 francs. Population 328,195. Rhodez is the capital of the department. (*o*)

AUGER, Boring, the name given to a very ingenious patent machine, invented by Mr Ryan, for boring through strata. The machine brings up a cylindrical portion of the rock through which it is passing, about five inches in diameter, and as it works perpendicularly, it exhibits the inclination of the strata. See *Repertory of Arts.* Other machines that have received the same name may be seen in the *Transactions of the Society for the Encouragement of Arts*, vol. i. p. 317, 320; vol. xix. p. 165. Bailey's *Machines*, vol. i. p. 159, 163. (*o*)

AUGITE. See Oryctognosy.

AUGMENT, in Greek grammar, is an accident of certain tenses, by which the letter ε is prefixed to the word, or the initial short vowel changed into a long one, or a diphthong into another longer one. (*j*)

AUGMENTATION, in the law of Scotland, is that process by which a clergyman may obtain an increase of his stipend. The power of allotting a suitable provision for the reformed clergy was originally vested in a commission of parliament, appointed by several acts of the legislature. This power was afterwards transferred, by the act 1707, c. 9. to the Court of Session; who have since sat as a commission, separate from the Court of Session, and modified stipends to the clergy, out of the teinds of the parish where each minister officiates. For an account of the different regulations respecting this process, and the subject of Teinds, in general, see that article. (*z*)

AUGSBURG, the *Augusta Vindelicorum* of the ancients, an ancient free imperial city of Swabia, but now incorporated with the kingdom of Bavaria, is situated in a beautiful plain near the confluence of the Lech and Werlach, about forty miles north-west of Munich, and 300 miles west of Vienna. It was once a very flourishing, large, and handsome city, a principal seat in Germany of commerce, manufactures, and the liberal arts. Its position was favourable for trade between Italy, Tyrol, Switzerland, and the northern states; and accordingly it was for many ages the grand entrepôt of the commerce carried on between the Venetian territories and the different provinces of Germany, Bohemia, and the various states which extend from the Gulf of Venice to the shores of the Baltic. Here was held the celebrated diet of the empire, by Charles V. in person, A. D. 1530, at which the confederate princes, who had a few months before protested against the acts of the imperial diet of Spires, (which had declared any religious innovations rebellion against the Germanic body,) assumed the name of *Protestants.* At this diet of Augsburg, the well-known Lutheran *Confession of Faith*, consisting of twenty-eight chapters, concerning the nature, reasons, and extent of the separation from the Romish church, was drawn up by Melancthon; presented to the emperor and all the German princes; discussed with great earnestness for many weeks; and finally considered as the code of Lutheran Protestantism in Germany. The greatest delicacy of address was requisite in managing this business. The minds of men, kept in perpetual agitation by a controversy carried on for twelve years with unparalleled acrimony, without intermission of debate, or abatement of zeal, were now inflamed to a very high degree. They were accustomed to innovations, and saw the boldest of them successful. Having not only abolished old rights, but substituted new forms in their place, they were influenced as much by attachment to the system which they had embraced, as by aversion to that which they had abandoned. This spirit, and those views, were not confined to the ecclesiastics of the new sect. Some of the most powerful princes of the empire embraced them with equal ardour. The elector of Saxony, the marquis of Brandenburg, the landgrave of Hesse-Cassel, the dukes of Lunenburg, the prince of Anhalt-Dessau, together with the deputies of fourteen imperial free cities, joined in the solemn protest alluded to, and were present at the diet of Augsburg, to enforce and maintain the confession of faith presented by the learned Melancthon.

The elector of Saxony did not allow Luther to accompany him to the diet, lest his presence should inflame the minds of the opposite party to a degree incompatible with the object for which the diet was assembled. For the same reason, he and the confederate princes and deputies employed Melancthon, the man of the greatest learning, as well as of the most pacific and gentle spirit, among the reformers, to draw up the confession of their faith, expressed in terms as little offensive to the Roman Catholics, as a regard for truth and consistency would permit. Melancthon, who seldom suffered the rancour of controversy to envenom his style, even in writings purely polemical, executed a task so agreeable to his natural disposition with great moderation and address. The creed which he composed was read publicly in the city-hall of Augsburg, before the diet, and the catholic and protestant divines. Some of the former were appointed to examine it: they brought in their animadversions. A dispute ensued between them and Melancthon, seconded by some of his coadjutors; but though he softened some articles, made concessions with regard to others, and put the least objectionable sense upon all; though Charles V. laboured with great earnestness to reconcile the contending parties; so many marks of distinction were now established, and such insuperable barriers placed between the two churches, that all hopes of bringing about a coalition were utterly desperate, (See *Seckendorff*, lib. xi. p. 159, &c.) It was not merely the Roman Catholic party, however, to whom the proceedings of the diet of Augsburg, and the confession of faith given in by Melancthon, gave offence. A very numerous body of the Protestants themselves disapproved of the whole transaction, and separated, not only from the Catholic church for ever, but also from the Lutheran. They assumed the denomination of *Evangelical Reformed*, and are still known by that title, and constitute nearly one-third of the Protestants of all Germany.

The religious affairs of the empire remained in great confusion for twenty-five years after the dissolution of the diet of Augsburg, in 1530. Ferdinand of Austria, brother of Charles V., and to whom the emperor had procured the dignity of king of the Romans, sincerely wishing an accommodation with the Protestants, called together a new diet at Augsburg in 1555, and contrived to establish something like a religious peace in Germany. A recess was framed on the 25th of September 1555, approved of, and published with the usual formalities. It contained, among other articles, the following, which we give as a specimen of the *ne plus ultra* of the religious toleration of the age. "Such princes and cities as have declared their approbation of the confession of Augsburg, in 1530, shall be permitted to profess the doctrine, and exercise the worship, which it authorises, without interruption or molestation from the emperor, the king of the Romans, or any power or person whatsoever. The Protestants, on their part, shall give no disquiet to the princes and states who adhere to the tenets and rites of the church of Rome. For the future, no attempts shall be made towards terminating religious differences, but by the gentle and pacific methods of persuasion and conference. The popish ecclesiastics shall claim no spiritual jurisdiction in such states as receive the confession of Augsburg. Such as seized the revenues or benefices of the church, previous to the treaty of Passau, shall retain possession of them, and be liable to no prosecution in the imperial chamber on that account. The supreme civil power in every state shall have right to establish what form of doctrine and worship it shall deem proper; and if any of its subjects refuse to conform to these, shall permit them to remove with all their effects whithersoever they shall please. If any prelate or ecclesiastic shall hereafter abandon the Romish religion, he shall instantly relinquish his diocese, or benefice, and it shall be lawful for those in whom the right of nomination is vested, to proceed immediately to an election, as if the office were vacant by death or translation, and to appoint a successor of undoubted attachment to the ancient system."

Such are the capital articles in the famous recess of Augsburg in 1555, which was the basis of religious peace in Germany, and the bond of union among its various states, the sentiments of which are so extremely different with respect to points the most interesting and important. In our age and nation, to which the idea of toleration is familiar, and its beneficial effects well known, it may seem strange, that a method of terminating their dissensions, so suitable to the mild and charitable spirit of the Christian religion, did not sooner occur to the contending parties. But this expedient, however salutary, was so repugnant to the sentiments and practice of Christians during many ages, that it did not lie obvious to discovery. It was towards the close of the seventeenth century, before toleration, under its present form, was admitted into the republic of the United Provinces, and from thence introduced into England. Long experience of the calamities flowing from mutual persecution, the influence of free government, the light and humanity acquired by the progress of science, together with the prudence and authority of the civil magistrate, were all requisite in order to establish a regulation so opposite to the ideas which all the different sects had adopted, from mistaken conceptions concerning the nature of religion, and the rights of truth, or which all of them had derived from the maxims of the church of Rome.

The recess of Augsburg, it is evident, was founded on no such liberal and enlarged sentiments concerning freedom of religious inquiry, or the nature of toleration. It was nothing more than a scheme of pacification, which political considerations alone had suggested to the contending parties, and regard for their mutual tranquillity and safety had rendered necessary. Of this there can be no stronger proof than an article in the recess itself, by which the benefits of the pacification are declared to extend only to the Catholics on the one side, and to such as adhered to the confession of Augsburg, in 1530, on the other. The followers of Zuinglius and Calvin remained, in consequence of that exclusion, without any protection from the rigour of the laws denounced against heretics. Nor did they obtain any legal security until the treaty of Westphalia in 1648, near a century after this period, provided, that they should be admitted to enjoy, in as ample a manner as the Lutherans, all the advantages and protection which the recess of Augsburg affords.

The philanthropist cannot help regretting the miserable figure which human reason and human passions have made in every age, in a field where the first ought to have displayed its noblest engines, and the last to have been either absolutely subdued, or at least kept under decent controul, namely, the field of Christian controversy. In it, the *bilis theologicus* has tainted every feature of the countenance, and poisoned every feeling of the heart. Although not always armed with the scymitar of the Arabian impostor, or in a condition to propagate, by force of arms, opinions which reason rejects on any other conditions, yet Christian theologians have raged with equal fury against their antagonists in secret, and betrayed as fierce a spirit as if they had inhaled the fiery blast wafted by the lion and the tiger around the standard of Mahomet; alas, they always forgot, that "*'tis the heretic that makes the fire, not he that burns in it!*"—Shakespeare.

Augsburg has declined in importance ever since the trade of Germany forsook the direction which Venice, in her better days, had given it. The rise of the Dutch commonwealth, and the corresponding influence of cities like Hamburgh, Bremen, Embden, Frankfort, &c. better situated for carrying on the commerce, which now took a westerly direction, instead of continuing in the ancient tract, have proved highly injurious to this place. Yet it is still, in spite of every disadvantage, a place of some consideration, and manages a great part of the transit and banking business of Bavaria, Swabia, and the adjoining districts. There are indeed no *Fuggers* or *Welsers* now to be found in it, to lend their emperor millions of dollars on demand; nor is Augsburg the great resort of the literati of southern Germany. The business of the last mentioned order of men has dwindled into the manufacture of paltry devotional tracts for peasants and children, and the construction of coarse maps, picture-books, and toys for the lower classes of their countrymen.

As Augsburg now constitutes a part of Bavaria, and is in every respect as dependent upon that crown as if it had never enjoyed the privileges of a free imperial city, it is needless to describe a constitution and police which were much talked of in Germany, but are now no more. The Rath-haus, or town-hall, 110 feet long, 48 broad, and 52 high; the large square, of which it forms a part; the cathedral, with its two tall spires; the public fountains, some of them said to have been built by Cæsar Augustus; the intricate gate towards the Lech; and the aqueduct which carries the water of that river into the city, in sufficient quantities to supply mills and considerable manufactories with that necessary,—are often mentioned with admiration, both by statistical writers and by travellers, as well as by the natives. But to a Briton they appear diminutive and insignificant: One of the locks of our canals, and the smallest man of war in our navy, yields a much finer display of human ingenuity and address. The manufactures are still considerable, though greatly inferior to what they were before the incorporation of the city with Bavaria. They consist of cotton-goods, tobacco or snuff, mirrors, leather, paper, carpets, gold and silver laces, sealing-wax, cordials, jewellery, clocks and watches, stone-ware, dyeing, bleaching, and printing, besides other branches connected with these manufactures. It is probable, that, in consequence of the late acquisitions of Bavaria, and of the favourable situation of this city for the Italian trade, it may yet recover, in some degree, its former rank among the German mercantile stations. The prices of the necessaries of life are as low as in any of the larger commercial towns of the continent; and the country round about it is beautiful and fertile. The academy, or college, formerly supported by the Lutherans, is gone into decay, and has not been replaced by any other learned seminary of note; but the present monarch of the country has always manifested liberal and enlightened principles of government, and will naturally promote the improvement of the second city in his dominions.

The population of Augsburg has, since 1788, fluctuated betwixt 30,000 and 36,000 souls, of whom two-thirds are Roman Catholics, and the rest Protestants. Jews were not, until 1805, admitted to live within the walls; but such as carried on business there, lodged in a village half a league from the city, and paid a certain tax for liberty of trading in it through the day. The manners of the people are, like those of the principal free cities of southern Germany, compounded of the primitive ones of the imperial towns, and of the modern of Germany in general. They have afforded the German poets and novel writers abundant scope for ridicule, as we may see from the humorous works of Wieland, Iffland, Schrœder, La-fontaine, Kotzebue, and many others, who lash without mercy the lust of titles, the vanity, the love of scandal and detraction, the purse-pride, and absurd self-importance, and, in short, the whole *Rleinstadtisches Wesen* (little royal-burgh existence) of those free commercial towns. The foreigner, however, has usually met with much kindness and genuine hospitality among their inhabitants; and although he seldom found the light manners, and the versatile elegance of Dresden, Berlin, or Vienna, he was perhaps fully recompensed by that primeval honesty, and a something approaching to originality of character, which he looked for in vain in other parts of Germany.

Augsburg has suffered severely from military contributions during the late wars. Its ramparts and fortifications were not in condition to hold out one moment against a powerful assailant; and accordingly, it has been for sixteen years past the drudge of Bavarian, Austrian, and French armies, in succession. It is now incorporated finally with a powerful state, and enjoys a prospect of better times. Every Briton ought to wish for its prosperity, for no where are our countrymen better received, or treated with more honourable marks of kindness and distinction. E. Long. 10° 53′ 38″, N. Lat. 48° 41′ 22″. See *Busching; Robertson; Nicolai; Riesbeck; Reichart, &c.* (J. M.)

AUGURY, an ancient mode of divination, which professes to discover the will of heaven, and the secrets of futurity, by attending to the motions and voices of birds. This superstitious art was called by the Greeks ὀρνιθεια, or ἡ οἰωνιστικη, or οἰωνομαντεια; the derivation of which words is sufficiently obvious. The origin of the term *augury* is not so clearly ascertained. Festus and others have derived it, *ex avium gestu, vel garritu*, from the flight or chirping of birds. Among the many strange conjectures which etymologists have proposed on this subject, we are surprised that none of them have ever thought of *avis* and *quæro*, or of *avis* and *Car*, the name of the person who, according to some authors, was the first teacher of the art, and from whom his posterity the Carians learned it. Or why may it not be from the Chaldaic גזרין, the soothsayers who cut up and in-spected the victims? We are rather disposed, however, to derive the word *augury* from another source, which has been overlooked by all the authors whom we have consulted, viz. the Hebrew עגור (*ôgur*), signifying a *swallow* or *crane;* a name which might be formed by *onomatopœa*, from their peculiar cry; but which we rather think is a derivative of the verb גור, to sojourn; or עגר, to return home. These birds of passage appear to have been among the first to impress mankind with a conviction of their superior sagacity, because, at intervals wisely chosen and accurately measured, they disappear from their temporary habitations, and revisit them when the genial spring puts forth its buds, and awakes the voice of the turtle. It was remarked by Ælian, that they recognise their former nests as readily as men know their accustomed dwellings, (την ἑαυτων ἑκαστον καλιαν ἀναγνωριζειν, ὡς την ὀικιαν ανθρωποι.) And the prophet Jeremiah, (viii. 7.) indignantly lamenting the insensibility of his countrymen, says, "The stork in the heaven knoweth her appointed times; and the turtle, and the crane, and the swallow, observe the time of their coming; but my people know not the judgment of the Lord." This circumstance, as well as the mournful twittering of these timorous and perpetually agitated birds, might inspire a belief that their departure was portentous of desolation, their approach the harbinger of gladness, and their agonising scream the sure prognostic of woe. And might not the name of these ominous creatures be readily transferred to the diviner, who ventured occasionally to visit the unseen regions of Erebus, and who, in accents more dismal than the horrific note of the owl, or the ear-piercing shriek of the bittern, muttered out his pretended expositions of the mysteries of fate?

We do not pretend to know where the art of augury took its rise. It was held in the highest estimation by the Phrygians, the Arabians, the Lycians, and all the Asiatics. The Cilicians, Pisidians, and Pamphilians in particular, (as we are told by Cicero,) regarded it as the surest mode of predicting the things to come. It was cultivated also by the Athenians, the Lacedemonians, and other Grecian states; and even the schools of philosophy, with scarcely an exception, gave implicit credit to its rules. The Romans borrowed it from the Etrurians, who said that it was revealed to them by Tages, a supernatural being of earthly extraction, who sprung out of a furrow, and instructed the astonished rustics in the profound *arcana* of the invisible world. By an ancient law of the Roman senate, it was decreed, that no measure of importance should be undertaken without consulting the Tuscan augurs; and whenever any prodigy occurred, it was customary to send a mission into Etruria, to obtain a solution of the phenomenon. These embassies, however, equally hazardous and inconvenient, were very far from giving satisfaction. It was therefore thought expedient to send six, or, according to other accounts, ten of the noble youth to Fesulæ, to be initiated in the principles of the art at the seminary of augurs.

Romulus and Remus were practitioners of augury. The former established the college of augurs, originally consisting of three members, to whom a fourth was added by Servius Tullius. These four were all of patrician rank. Five plebeians were afterwards added to the number; and, in the dictatorship of Sylla, a farther addition of six was made; after which period there was no addition or reduction of the numbers. These fifteen augurs were next in dignity to the college of *pontifices;* and, though their authority was merely negative, they had it in their power to controul the highest officers of the state, and either to aid or obstruct the functions of government. Their office was held for life, and could not be forfeited by the commission of the most flagrant crimes. The robe of an augur was a mixture of purple and scarlet, named the *trabea*. He wore a conical cap; and, when exercising the duties of his mystical function, he held in his hand the *lituus*, a staff neatly incurvated at the top. Equipped in these peculiar badges of his office, he was prepared for the solemnity of taking the auspices from the meteors of the atmosphere, and from the winged messengers of Phœbus or of Jove. He walked out of the city at midnight, pitched a tent on an eminence, lay till the dawn began to brighten, and then, after offering up prayers and sacrifices, sat down with his face directed to the east, or, as others tell us, to the south. With his crooked rod he circumscribed a space in the sky, beyond which he suffered not his eyes to wander. This imaginary space, on which his attention was rivetted, was named *templum;* and hence arose the word *contemplation*, in the same manner as the term *consideration* originated from the eagerness with which the astrologer gazed on the stars. Omens on the left were generally accounted propitious by the Romans; but the Greeks thought omens on the right more favourable. The reason commonly assigned for this apparent discrepancy, is, that the former looked towards the south, and the latter to the north, when they expected signs from the heavens; so that the east, the quarter whence they looked for happy omens, was to the right of the one, and to the left of the other. There were, however, no general principles followed by any set of augurs; and what, on one occasion was hailed as the most joyful omen, was, on others, deplored as the presage of inevitable misfortune. Cicero informs us, that the rules observed by him were, in many respects, diametrically opposite to those of his friend King Deiotarus; and that the particulars, accounted the most essential by the Pamphilians and Cilicians, were unknown, or disregarded by the professors of the art at Rome.

The Roman augurs did not confine their attention to birds. There were five classes of phenomena from which they sought information: appearances in the sky; the singing or the flight of birds; the feeding of the sacred chickens; the motions of particular quadrupeds; and the accidents called *diræ*. Lightning from the left to the right was one of the most favourable appearances which could visit them from the sky, except when it was proposed to hold the comitia. The birds from whose voice omens were taken were called *oscines;* such as the cock, the owl, and the raven: creatures whose never-ceasing volubility furnished the interpreters of their inarticulate speech with inexhaustible stores of imposture. The *præpetes* were the fowls of boldest wing, in whose flight there was supposed to be great significancy, such as the hawk, the eagle, and the vulture. The sacred chickens were confined in pens, under the charge of the *pullarius*. It was a most lamentable presage if they refused to eat; but their devouring the food set before them so eagerly as to drop part of it, was one of the most indisputable signs of good fortune, and was called *tripudium*, (or *terripavium*, from striking the ground). Their superintendant, no doubt, understood the art of eliciting hopeful or disastrous intelligence, by means of seasonable inanition or repletion. He was but a bungling *pullarius* who could not contrive to effect a *tripudium;* and, from the artifice which he employed, arose the phrase *auspicium coactum et expressum.* A chicken, previously half starved, may be expected to stuff so voraciously, that much of the grain will escape from its beak. The omens from quadrupeds were such as a wolf on the right carrying something in his mouth, which was favourable; a hare crossing a road,—a strange dog, especially if black, coming into a house, —both of which were portentous of evil. Among the *diræ*, it was very discouraging to spill oil, or salt, or honey; but nothing could be more lucky than the accidental spilling of wine, so as to leave an indelible stain on the garments.

These weak superstitions, contemptible as they appear to us, are not yet entirely exploded. The vulgar in every nation ascribe a wonderful degree of significancy to frivolous incidents like those which have now been enumerated; and we have seen persons of considerable strength of intellect, not a little agitated at the sight of a magpie, or the voice of a cricket. All the world has heard, that if a company happen to consist of thirteen, one of the number may expect soon to die; and what man or woman is ignorant of the prophetic virtue inherent in bees-wax, or mutton-fat, when moulded into the magic form of a a candle? Such popular follies as these are finely ridiculed by Addison, in the 7th paper of the Spectator. It is no new thing, indeed, to attack them with the weapons of ridicule. In the 12th book of the *Iliad*, Hector chides Polydamas for wishing to retire from the field, because an eagle appeared in the air, carrying a bleeding serpent in his talons. After expressing his contempt for the movements of birds, whether to the right or to the left, he introduces this noble sentiment:

> Ἑις οἰωνος ἀριστος, ἀμυνεσθαι περι πατρης.
>
> From chains to save his country,—to repel
> Her ruthless foes, and save a falling state;
> This glorious omen stimulates the brave,
> Whose lofty purpose is the pledge of triumph.

Cicero also, though himself a member of the fraternity, speaks very contemptuously of their pretensions. "Where is the wonder," says he, "that a cock should be clamorous, an animal which scarcely ever ceases to strain his throat, either by night or by day? It would be a prodigy indeed, if a fish were to do 'salutation to the morn,' in a shrill canorous voice, like the crowing of a cock." After Christianity was introduced into the Roman empire, augury gradually lost its credit. It was discouraged by Gratian, and condemned by various ecclesiastical councils. In times still more modern, however, some delirious pretenders to magic, such as Michael Scot, attempted to revive and methodise the art, which had then fallen into desuetude; but, notwithstanding their efforts to save it from oblivion, augury, strictly so called, is now so completely obsolete, that its arbitrary canons are no longer interesting, except to those who delight in obscure and chaotic researches.

To account for the origin of a practice so absurd, we shall merely suggest a few familiar facts, which might be supposed to make a strong impression on unenlightened men. The instincts of many animals, and particularly of birds, must have been remarked at a very early period. Some of them, as we have already hinted, disappear regularly at certain seasons, and, when the stated period of absence has elapsed, revisit the climate which they had forsaken; thus marking the vicissitudes of the year with almost as great precision as the progress of time is measured by the heavenly luminaries. In conjecturing the cause of these alternate emigrations and returns, it was not unnatural to ascribe them, either to sagacity greater than human, or to the influence of superior beings, by whose wisdom the hawk might have been taught, on the approach of winter, to "stretch her wings toward the south." In addition to the facts relating to migratory birds, men could not fail to observe such a connection between the actions of various species of fowls and subsequent variations of weather, as might seem to imply a power of foreseeing the changes which are about to take place in the state of the atmosphere. But the most impressive circumstances are those which are observed with regard to carnivorous birds, particularly their crowding from the most distant regions to the fields of slaughter, and the scenes where the pestilence is spreading its ravages. "From the crag of the rock the eagle seeketh her prey; her eyes behold afar off; her young ones also suck up blood: and where the slain are, there is she." After men have been accustomed to associate the eagle, the vulture, and the raven, with the shocking consequences of a battle, it is not wonderful that the sight of these rapacious creatures, hovering near an army, should inspire horror, and that the blood-thirsty perspicacity, which attracts them from afar, should be considered as an indication of prescience greater than human. Whenever the imagination is thus excited, the concurrence of the most fortuitous and unimportant circumstance will be apt to mislead the judgment; and whenever any erroneous conclusion gains admission into the mind, it is impossible to calculate the extreme impositions to which it may ultimately lead. An event, favourable or unfavourable, occurring soon after any singular appearance, or after any unusual combination of circumstances, however frivolous, is probably noted as forming a link in the apparent chain; and thus the most chimerical principles are gradually established; so that what was at first nothing more than vague conjecture, comes, in the course of time, to be considered as an indisputable truth. Of these prepossessions it is not wonderful that designing men should have taken advantage, so as to convert the superstitious tendencies of the untutored mind into engines of despotic rule, and auxiliaries of passive obedience. Such also is the force of prejudice, that a delusion, once introduced, (no matter how slight its foundations,) often maintains its ground after its absurdities are exposed, and its futility demonstrated. —The augury of Romulus owed its origin to credulity; but, under his successors, it grew into a deliberate scheme of imposture, which was not effectually overturned till the light of Christianity had dispelled the gross darkness of heathenism. See Auspices and Divination. See also Cic. *De Div.*; *Dionys. Hal.*; Ovid. *Fast.*; Adam's *Roman Antiquities*; De la Chausse *De Pont. Max. Augur. &c.* August. Niphi *De Augur.*; Bulengerus *De Augur. et Ausp.*, apud Grævii *Thesaur.* tom. v. (λ)

AUGUST, the name of the eighth month of the year. It was the *sextilis* of the Roman calendar; but, in consequence of several victories gained by Augustus during that month, he gave it his own name. (*w*)

AUGUSTA, a town situated on a peninsula on the east coast of Sicily, built near the ruins of the ancient city of Megara. In the year 1673, this town was nearly destroyed by a dreadful earthquake. One-third of the inhabitants were killed by the fall of the houses; the powder-magazine in the citadel was set on fire; and the light-house was plunged into the sea. The town is now rebuilt, according to an uniform plan, and the houses are made extremely low. A long causeway, with salt-ponds on each side, stretches across the mouth of the peninsula; and the arm of the sea forms an admirable harbour, sheltered from the winds and the waves, and defended by three forts built on little islands. Magazines of provisions were formerly established here by the knights of Malta, for the supply of their ships. Population 16,000. E. Long. 15° 8′, N. Lat. 37° 8′. See Swinburne's *Travels*, vol. iv. p. 116. (π)

AUGUSTINE, Saint, named also *Aurelius Augustinus*, was born in the year 354, at Tagasta, a small town of Africa, in the inland part of Numidia. His father, whose name was Patricius, though possessed of little wealth, was held in considerable estimation by his fellow-citizens, and filled for some time the office of a magistrate in the town above mentioned. His mother Monnica, who is represented as a woman of great piety, carefully instructed her son in the principles of Christianity, and watched his future conduct with the most anxious affection. He was sent, at an early age, to a place of public instruction, where he shewed a capacity so quick as to require very little application; but, at the same time, so strong a tendency to youthful sports, as greatly tended to impede his progress in learning. He soon indicated a strong dislike to Grecian literature, but was very much interested by the perusal of the Latin mythologists, and extremely attached to all theatrical exhibitions. During a season of sickness he requested that he might be baptised; but his mother, who was well aware of his vicious propensities, and who had rather a superstitious notion, that sins were peculiarly aggravated when committed after baptism, procured the ceremony to be deferred. In 371 he was sent to Madaura to pursue his classical studies; and, after the death of his father, he was enabled, by the assistance of his friends, to visit the city of Carthage, in order to complete his education. Here he addicted himself to every species of licentiousness; became disgusted with the profession of the law, to which he had at first directed his attention; was attracted, for a time, to the study of philosophy, in consequence of perusing one of Cicero's dialogues, entitled *Hortensius*;* turned from this pursuit to the examination of the sacred scriptures; but, offended by the simplicity of their style, and anxious to understand every thing by demonstration, he at length attached himself to the followers of Manichæus. At the intreaty of his mother, who had followed him to Carthage, he returned in 374 to the place of his nativity, where he taught grammar and rhetoric, during the space of six years, with great applause. The death of an intimate friend having rendered him unhappy in that situation, he removed to Carthage in the year 380, and continued to give instructions as a rhetorician with uncommon reputation and success. Still indulging his habits of dissipation, he attached himself, about this time, with great constancy, to a concubine, by whom he had a son named Adeodatus. Becoming dissatisfied with the doctrines of his Manichæan friends, and provoked by the insolence of his pupils at Carthage, he went to Rome in 383, with his mistress and child, leaving his mother behind, without any information of his departure. His fame spread very rapidly in this metropolis; and, by the favour of Symmachus, præfect of the city, he was appointed professor of rhetoric in Milan. In this place, his celebrity as a teacher continued to increase, while his character was debased by his illicit indulgences. By the sermons of Bishop Ambrose, which he at first attended only for the sake of their eloquence, by a more intimate acquaintance with that eminent prelate, and by the intreaties of his mother, who had followed him to Milan, he was persuaded to abandon his Manichæan sentiments, to dismiss his concubine, and to consent to enter the married state. Before his good purposes were accomplished, however, he relapsed into his old irregularities, and formed another illicit connection. At length, having entered upon the study of Paul's epistles, and being assisted by the exhortations of a presbyter named Simplician, he resolved, after a long and hard struggle, to abandon all secular pursuits, and to devote himself to a life of devout contemplation. He relates, that he was led to this determination by a very extraordinary circumstance; that while meditating in his garden he seemed to hear a voice addressing him in these words,—"Take and read, take and read!" that, upon opening the New Testament, he was presented with this passage, —"Let us walk honestly as in the day, not in rioting and drunkenness, not in chambering and wantonness," &c. (*Rom.* xiii. 13.); that his friend Alipius, upon hearing what had happened, pointed out, as applicable to himself, these words in the beginning of the following chapter,—"him that is weak in the faith receive you;" and requested, therefore, to be received as his fellow Christian. They retired with some friends to a residence in the country; employed a considerable time in reading and prayer; and were baptised together by Bishop Ambrose in the year 387. Augustine immediately set out for his native country; stopped at Rome on his way, where he composed a work against the Manichæans; and while waiting at Ostia for an opportunity to embark for Africa, was deprived of his constant attendant and faithful counsellor, his mother Monnica. As soon as he arrived at Tagasta, he withdrew to a country residence, where he lived with a few select friends, in imitation of the first Christians, "having all things common." After spending about three years in this manner, he went to visit a person of rank in the city of Hippo Regius. During his residence there, it happened that the priest's office was vacant, and Valerius the bishop had assembled the canons for the purpose of electing another incumbent. Augustine having entered the church to witness the form of proceeding, was instantly presented to the bishop, by the unanimous consent of the assembly, as the fittest person to be chosen; and, in spite of all his remonstrances, was ordained a presbyter in the year 391. He still continued to follow the manner of life which he had begun in his late retreat; formed his associates into a kind of religious society; and thus at length gave rise to the Augustine Friars, or eremites of St Augustine. In 394, he had a dispute with Jerome, in which he treated his venerable opponent with so much respect, that they afterwards became very intimate friends. As Valerius was a Greek, and found considerable difficulty to speak publicly in the Latin language, he appointed Augustine to preach in his place, and even in his presence, though this was contrary to the custom of the African church. He signalized himself very much at a provincial council in 393, by pronouncing an exposition of the creed; and, in 395, by the influence of his friend and patron Valerius, was installed as joint bishop of the church at Hippo. He wrote much against the Manichæans, and was very successful in vindicating from their objections the authority and integrity of sacred scripture. He laboured also with great activity and ability to expose the dangerous principles of the Donatists; narrowly escaped assassination from some of that sect in 398; but was not deterred from acting a very conspicuous part in the council which was held against them at Carthage in the year 411. By a council of the African clergy in 418, he was publicly requested to refute the errors of Pelagius and Celestine; and to him is principally due the credit of having checked the progress of their opinions. In the course of this controversy, Pelagius wrote to him a very soothing and flattering epistle; in reply to which, Augustine requested him, "rather to pray to God to make him, by his grace, such as he (*i. e.* Pelagius) had described him, than continue to describe him such as he was not." In 426, in the seventy-second year of his age, he chose a person named Eradius to assist him in his public duties, and after this employed himself almost entirely in writing upon a great variety of subjects. In 430 Hippo was invested by the Vandals, and sustained a siege of fourteen months. The aged bishop resolved to share the distresses of his people, and continued to encourage them to the last. But he was soon overpowered by the excessive fatigue which he underwent, and died with every indication of sincere penitence and fervent piety, on the 28th of August 430, in the seventy-sixth year of his age. About seven months after this event, the city of Hippo was taken and burned by the Vandals; but the library of Augustine, containing an immense number of his own writings, was carefully preserved. The most accurate and splendid edition of the works of Augustine, is that which was given by the Benedictines, printed first at Paris in 1679, and afterwards at Antwerp in 1700, with some augmentation by Le Clerc, under the fictitious name of Phereponus.

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* This dialogue is not now extant.

The literary talents of Augustine have been estimated very high by those who were most competent to judge of the subject. "The fame of Augustine, bishop of Hippo," says Mosheim, "filled the whole Christian world, and not without reason, as a variety of great and shining qualities were united in the character of that illustrious man. A sublime genius, an uninterrupted and zealous pursuit of truth, an indefatigable application, an invincible patience, a sincere piety, a subtle and lively wit, conspired to establish his fame upon the most lasting foundations." He is blamed by the same writer, however, as deficient in solidity of judgment; as having yielded too often to the violent impulse of a warm imagination; and as ready to write upon a variety of subjects before he had examined them with a sufficient degree of attention and diligence. The force of this censure is in some respects diminished by the opposite testimony of the candid and discriminating Lardner, who affirms, that good sense was the distinguishing part of his character as a writer; that in points which depended upon reasoning, he was as able to form a right judgment as those who have been preferred to him; and that in learning, in Greek literature, and in critical ability, his attainments must have been much greater than has been supposed. To all these qualities, according to Erasmus, *aderat, interim, miranda quædam animi lenitas . . . quam Plato putat non ita frequenter deprehendi in his quibus contigit acrius ingenium.* With regard to his character, in a more important point of view, there is no doubt that, during the first half of his life, he was the slave of depraved passions, and of the most extravagant opinions. Of this his own *Confessions*, and every account that we have of his life, furnish the most unquestionable evidence. But we have the very same evidence to believe, that, after the time of his solemnly assuming the character of a Christian, he was as eminent for his virtues as he had formerly been for his vices; that he discharged the public duties of his clerical office with the utmost fidelity, earnestness, and affection; that, in private life, he was distinguished by humility, candour, and benevolence; that his reformation was complete, and his penitence most sincere; and that the insinuations which have been thrown out against the reality of his temperance and devotion, are groundless and illiberal in the extreme. See Mosheim's *Church History*, vol. i. p^t. 2. cent. 4. ch. 2.; Godeau *Hist. de l'Eglise*, vol. ii. p. 549.; vol. iii. p. 94, 280.; Lardner's *Cred.* vol. iii. p. 392.; vol. v. p. 81.; *Augustini Vita a Benedict. conscript.*; Tillemont, *Mem. Eccles.* tit. 13. (*q*)

AUGUSTULUS, the last of the Roman emperors in the west. See Gibbon's *Hist.* chap. 36. vol. vi. p. 186. (*j*)

AUGUSTUS. See OCTAVIUS.

AVICENNA, or Ibn-Sina, an Arabian physician and philosopher, was born at Bochara, about the year 978. He has been celebrated for the precocity of his talents. When he was scarcely ten, he is said to have made great proficiency in polite literature, and to have been master of the Alkoran. Abu-Abdallah, a famous lecturer in philosophy, undertook to instruct him in the art of logic; but the pupil was soon convinced of the deficiences of his teacher, and declined receiving any farther assistance from him. With an ardour which no disappointment could quench, and with a constancy of application which never yielded to fatigue or difficulty, he successively studied mathematics, philosophy, and medicine; and, before he was seventeen years of age, no person could be found in his native city who was capable of giving him farther instruction in any of these branches of knowledge. In the school of Bagdad, where he afterwards studied for some time, he was regarded as a prodigy of learning. He scarcely allowed himself leisure for sleep or nourishment, and, if we could credit the marvellous tales of his biographers, his mind was perpetually awake. To the difficulties which absolutely baffled his judgment during the day, he persuaded himself that he found a ready solution in his dreams. This he piously ascribed to celestial illumination granted in answer to his prayers.

There is more of the romantic than of the credible in the life of Avicenna. With these hyperbolical accounts of his almost supernatural capacity, we are at a loss to reconcile the extreme difficulty which he found in comprehending the metaphysics of Aristotle. It is said, that after the astonishing progress, at which we have only hinted, he read over that work not less than forty times without understanding a word of it. We are apt to suspect, that the perspicacity of the youthful philosopher had either been prematurely dimmed, or that the boasted sciences which he had already mastered were not very profound, if they did not enable him to divine any meaning in the pages of Aristotle. One would suppose he had been under the influence of enchantment; for it seems an Arabian manuscript, which accidentally fell into his hands, dissipated the charm in an instant. In a transport of gratitude he flew to the mosque, and offered up fervent thanksgivings to heaven for dispelling his darkness. From this moment he was consulted as an oracle, to whose sage decisions the learned, the venerable, and the aged, yielded with implicit deference, as if he had been possessed of the gift of infallibility. We speak of him while only a youth of eighteen.

His celebrity, as a man of science, was equalled by his fame as a physician. But we forbear to recite the strange adventures which, we are told, were occasioned by the eagerness with which he was courted by different sovereigns. We believe the accounts to which we allude are almost entirely fabulous; and we are convinced that our readers will not expect us to repeat all the legendary tales which ignorance and credulity have attempted to impose on posterity. It is pretty well ascertained, that the last years of this applauded philosopher were embittered by misfortunes, the fruit of his own vices and follies; and that his days were shortened by the excesses of criminal pleasure. He died about the year 1036, in the fifty-eighth year of his age.

This man was an incongruous compound of voluptuousness and fanaticism. Devotion and sensuality occupied him by turns. His studious habits, and his attention to the affairs of state, when he acted in the capacity of grand vizier, accord ill with the accounts which have been preserved of his libertinism. His panegyrists, however, have spoken of him in a strain of admiration, which would almost persuade us that they are painting an ideal character. He wrote with great rapidity and ease; and few authors have written more. Till the time of Averröes, his books were held in the highest estimation. He wrote a great number of treatises on morals, theology, mathematics, astronomy, philology, metaphysics, logic, natural philosophy, natural history, and medicine: And, when he was only twenty-one years of age, he planned a comprehensive view of all the sciences, which, without any assistance, he soon accomplished, though it extended to twenty volumes. This work, which he named *The Utility of Utilities*, professed to be a complete Encyclopædia of human knowledge. There are some who say, that Avicenna was a mere plagiarist. So far as we have the means of judging, we do not hesitate to pronounce him a careless and hasty compiler, without taste, or judgment, or discernment; and yet we have met with some comparatively modern authors, who speak of him as a most luminous, methodical, and profound writer, who never introduces a subject without throwing new light on it, and who is so remarkable for solidity and precision, that he can never be charged either with too great diffuseness, or too great condensation.

The scholastic divines were great admirers of Avicenna, partly, we believe, because he pretended the most devoted attachment to Aristotle, and partly in consequence of his having professed sentiments differing less than any of the other Arabians from the Christian faith. On some points, however, his heterodoxy is enormous: He rejects the doctrine of grace as altogether superfluous; he admits the eternity of motion; he denies that the world could have been made without pre-existing matter; he asserts, that nothing which is subject to change can proceed from God; he opposes the doctrine of a particular providence,—meaning by this term the knowledge of individual objects; he maintains that the visible heavens are animated; he ascribes to angels the faculty of propagating celestial souls; and assumes it as an indisputable truth, that angelical intelligences cannot form any conception of evil. He has been celebrated as an adept in the mysteries of alchemy and the other occult sciences; and we believe that he was as much skilled in these chimerical doctrines as in any of the substantial branches of knowledge. Upon the whole, we regard him as a weak visionary, who has contributed to retard the progress of the human mind. See Hottinger. *Bib. Orient.*; Bartoloec. *Bib. Rabb.*; Leo Afr. *De Vir. illustr. Arab.*; Mercklin. *De Script. Med.* (λ)

AVICENNIA, a genus of plants of the class Didynamia, and order Angiospermia. See **Botany**. (*w*)

AVIGNON, a city of France, and capital of the department of Vaucluse, is situated on the east bank of the Rhone, and includes a circumference of about three miles and a quarter. It is surrounded with handsome battlements and turrets. The streets and houses are in general irregular and ill built, but the public edifices are solid and grand, and indicate the splendour and magnificence of its former state. The churches of Notre-Dame, and of the Cælestines, contain several monuments and paintings equal to the finest in Italy, and their valuable curiosities are particularly deserving the attention of the traveller. In Avignon they reckon seven gates, seven palaces, seven colleges, seven hospitals, and, before the revolution, it had seven monasteries, and seven nunneries. Near the Rhone is a large rock, upon which is a platform which overlooks the whole city with its environs; and across the river stand the ruinous and decayed arches of an extensive bridge, which was demolished by an inundation in 1699. About five miles from the city is the fountain Vaucluse, where Petrarch often retired to indulge his grief and hopeless passion. On the almost inaccessible extremity of a rock which overhangs the fountain, the peasants point to an ancient castle, and call it, *Il Castello di Petrarca:* and in an obscure corner of the church of the Cordeliers, is shown the almost defaced tomb of his Laura, and her husband Hugh de Sade. In Avignon there are a considerable number of Jews, who, when this city was under the jurisdiction of the popes, were exposed to the most oppressive restrictions. They were confined to a distinct quarter of the town, which was so crowded that they could procure accommodation only by building their houses higher; and they durst not stir from home without yellow hats, or head dresses to distinguish them from the Christians. From these oppressions, however, they have been relieved by the annexation of Avignon to France.

In a crusade against the Albigenses, A. D. 1226, Avignon was taken by Louis VIII. king of France; and in 1273, it was ceded to the pope, with the adjoining territory, by his grandson Philip III. In 1309, Clement V. transferred the papal court from Rome to Avignon. From that time its importance began rapidly to increase. Magnificent palaces arose for the accommodation of the pope and cardinals; new luxuries were introduced, and the simple abodes of the Albigenses were now filled with the vices and corruptions of a profligate priesthood. For 70 years the successors of St Peter had abandoned the sacred walls of the Vatican, and even after the papal see was again removed to the banks of the Tiber, Avignon continued to be the residence of a rival pope, until the accession of Martin V. in 1418. It was then erected into an archbishopric, and continued under the sovereignty of the popes till the late revolution in France, when it was declared a part of the republic. Population 30,000. E. Long. 4° 48′ 25″, N. Lat. 43° 56′ 38″. (*p*)

AVILA, a city of Spain, in the province of Old Castile. It is situated in a beautiful plain on the banks of the river Adaja, and is fortified by a wall of 9075 feet in circumference, flanked with 26 lofty turrets. Avila is the see of a bishop, suffragan of Compostella. It has a university founded in 1445, and a manufacture of cloths which are supposed to be equal to those of Segovia. The streets are in general regular; many of the houses are stately and well built; and the surrounding country is covered with orchards and vineyards. Avila has been rendered famous in history by the deposition of Henry IV. in 1465. The Castilian nobility, indignant at the feeble and flagitious administration of this prince, and arrogating to themselves the right of sitting in judgment upon their sovereign, assembled in the plain of Avila. Having placed upon a throne an image of Henry, arrayed in all the insignia of royalty, the several charges of accusation were read, and the sentence of deposition pronounced in the presence of a numerous assembly. The image was then stripped of its robes, and tumbled headlong from the throne; and Don Alonzo, Henry's brother, was immediately proclaimed king of Castile and Leon. See Robertson's *Hist. Ch.* V. vol. i. p. 179. W. Long. 4° 35′, N. Lat. 40° 45′. (*p*)

AULUS GELLIUS, (called by some *Agellius*,) a Roman author of considerable ingenuity and various learning, (*vir elegantissimi eloquii, ac multæ et facundæ scientiæ;* Augustin. *de Civ. Dei*, ix. v.) was born at Rome, and flourished there, as is supposed, in the time of Adrian and the Antonines.

Of his life and circumstances the commentators have been able to collect few memorials. Having acquired the elementary branches of education in his native city, under the direction of Sulpitius Apollinaris, Titus Castritius, and Antonius Julianus, he repaired to Athens, for the purpose of prosecuting his philosophical studies; and during his residence at that celebrated seat of learning and the arts, he enjoyed the advantage of a frequent and familiar intercourse with several of the most eminent literary characters of the age. In the philological and ethical sciences he made considerable progress; and, it is believed, he embraced the principles of his contemporary Phavorinus. After travelling through the states of Greece, he returned to Rome, and devoted himself to the profession of the law; in which he appears to have attained to respectability and eminence, and was appointed to the situation of a judge extraordinary. (*Noct. Att.* xii. 13.) The precise period of his death is uncertain.

The only work of Aulus Gellius now extant, is his *Noctes Atticæ*, which he began to write during his residence at Athens, with the view, as he informs us in his preface, of providing a proper species of entertainment for himself and his children. It is a learned and amusing miscellany, consisting of a variety of literary and philosophical anecdotes, historical and biographical notices, critical and philological remarks, &c. and is of considerable value, on account of the literary incidents and observations which it contains, and the passages of ancient authors which it has preserved and illustrated. It is valuable also in respect of the occasional information which it conveys, on the subject of ancient manners, customs, and opinions.

The style of Gellius has been the subject of much controversy among the commentators and critics, who are by no means agreed, whether he ought to be ranked among the writers of the *silver* or the *brazen* age. Without pretending to enter into the merits of this learned controversy, or to detract from the epithets *luculentus, nitidus, elegantissimus, latinissimus*, bestowed upon this author by many eminent and judicious critics, we shall only observe, that the reader of the *Noctes Atticæ* will occasionally remark some of those peculiarities which characterise the style of the later Roman writers. Those who are desirous of obtaining farther information upon this subject, may consult the preface to Mr Beloe's translation, and the authorities therein referred to; particularly, Falsterus, *De Vita et Rebus A. Gellii*, and Fabricius, *Biblioth. Lat.* vol. i. and ii.

The *Noctes Atticæ* were first printed at Rome, by Conrad Sweinheim, and Arnold Pannartz, in 1469. The editor was John Andreas, the learned bishop of Aleria. The most valuable of the subsequent editions are. 1. The edition of Jenson; *Venice*, 1472. 2. The edition of Aldus; *ibid.* 1515. 3. The edition of Henry Stephen; *Paris*, 1585. 4. The Elzivir edition; *Amsterdam*, 1651. 5. *Cum notis variorum; Leyden*, 1666. 6. *In usum Delphini;* 1681. 7. The edition of the Gronovii; Leyden, 1706. 8. Of Conradus; Leipsick, 1762.

Mr Beloe's translation, with critical and explanatory notes, was published in 1795; and will be of essential service to the student, besides being valuable to such as are deprived of the advantage of being able to peruse the original. (*z*)

AVRANCHES, the *Abricantæ* of the ancients, a very old town of France, in the department of the Channel. The cathedral, which stands on a hill, and the ruins of the castle, which are very extensive, are the only objects deserving of particular notice. Population 5413. W. Long. 1° 22′ 38″, N. Lat. 48° 41′ 18″. (*j*)

AURELIAN, one of the Roman emperors, was the son of a peasant, and a native of Sirmium in Pannonia. He entered the army as a common soldier, and was so distinguished by his extraordinary strength and courage, that he rose successively to the rank of a centurian, a tribune, the præfect of a legion, the inspector of the camp, the general of a frontier, and, at length, to the important office of commander in chief of the cavalry. He was invested with the consulship by the influence of the emperor Valerian; and married the daughter of Ulpius Crinitus, a senator of the highest rank and merit. At the death of Claudius II., who recommended him as his successor, he was saluted emperor by the army, A. D. 270; and their election was soon confirmed by the voice of the senate. Aurelian continued to reign only four years and nine months; but every instant of that short period was marked by some memorable atchievement. In the course of the year 270, he put an end to the war with the Goths; and repeatedly routed the Germans, who had invaded Italy. Returning to Rome, where some disturbances had taken place during his absence, he put to death several of the senators, who had been suspected of exciting these commotions; and by the severity of his conduct in this instance, estranged from himself, in a great degree, the affections of the people. After having repaired and extended the walls of the city, in the beginning of the year 271, he recovered Gaul, Spain, and Britain from the usurpation of Tebricus, governor of Aquitaine. In 272 he turned his arms against Zenobia, the celebrated queen of Palmyra, who had established a monarchy upon the ruins of the empire in the east, and had maintained her authority during the space of five or six years. He gained possession of Tyana in Cappadocia, after an obstinate resistance; and treated the inhabitants with the utmost lenity, from respect to the memory of their countryman Apollonius. Having defeated the forces of Zenobia in the neighbourhood of Antioch, he entered that place in triumph, and conciliated the citizens by the mildness of his measures. He gained a second victory near the city of Emesa; advanced, through all the obstacles of the sandy desert and plundering Arabs, to the siege of Palmyra; cut off the succours, which were sent from Persia for its relief; and at length intercepted the queen, when attempting to make her escape from the city. Her capital surrendered very soon after, upon condition that the lives of the inhabitants should be spared; but a few of the queen's ablest counsellors, among whom was the celebrated Longinus, were afterwards sacrificed at Emesa to the vengeance of the conqueror. A short time after his departure, the Palmyreans broke out into open rebellion; massacred the governor and garrison, left in their city; and proclaimed a kinsman of Zenobia their sovereign. But the avenging conqueror, naturally severe, and now roused into fury by the presumption of this revolt, and the slaughter of his troops, was soon at their gates, entered the city without opposition, put the inhabitants to the sword without distinction, and reduced that short-lived metropolis to a state of ruin, from which it never recovered. After having suppressed an insurrection, which had been excited at Alexandria by an adventurer named Firmus, whom he caused to be tortured and put to death, he returned to Rome in 274, and was honoured with a more splendid triumph than had ever been witnessed even in that city of triumphs.* On this occasion, he made his captives subservient to his military glory, but afterwards treated them with the greatest humanity and kindness. He gave to Zenobia lands and possessions in the neighbourhood of Tivoli; and appointed Tetricus governor of Lucania. Out of the spoils of his victories he built a magnificent temple to the sun, in whose service his mother had been an inferior priestess, and for whose worship he always professed a peculiar veneration. He applied himself with the utmost activity, during this short period of peace, to the suppression of various abuses, the prevention of crimes, and the general reformation of manners. He remitted all the debts, which had become due, in the course of the year, from private persons to the public treasury; and, at the same time, published an act of oblivion, with respect to all crimes committed

Aurelian.

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* For a particular account of Aurelian's triumph, see Vopiscus *Hist. Aug.* 220; Gibbon's *Rom. Hist.* vol. ii. p. 46.; and *Anc. Un. Hist.* vol. xv. p. 458.

against the state, previous to that date. He increased the largesses, bestowed upon the common people; and, as he was himself a plebeian, he always manifested a peculiar predilection towards that order of his subjects. The discontent, which this partiality excited among the senatorial and equestrian ranks, seems to have been the real cause of a very formidable insurrection, which broke out at Rome upon his attempting to restore the integrity of the coin; and which was not quelled till after a bloody engagement had been fought with the insurgents on the Cælian hill. Exasperated by this unprovoked rebellion, Aurelian let loose all the natural cruelty of his disposition; and his vengeance was not satiated till he had shed a torrent of the noblest blood in the empire. One of his own nephews was involved in this bloody prosecution; and the senate was deprived of its most illustrious members. About the close of the year 274 or the beginning of 275, the emperor marched towards Persia at the head of a well-disciplined army. Suspecting one of his secretaries of extortion, he had charged him with the crime, and threatened him with punishment. The offender, whose name was Mnestheus, aware of his danger, sought safety for himself by alarming the fears of others. Counterfeiting his master's writing, he shewed to some of the principal officers of the army a list of names, which he pretended to have found in the emperor's closet, and in which they were all devoted to death. Anxious to avert this impending destruction, they instantly united with the traitor, fell upon Aurelian on the march from Byzantium, and dispatched him with many wounds. The imposition, however, was soon discovered; Mnestheus was devoted to the rage of wild beasts; and the obsequies of the emperor solemnized with the greatest pomp.

The talents of Aurelian were better suited to the command of an army, than to the government of an empire; and he acted towards his subjects more like a conqueror than a sovereign. He was unequalled in point of personal prowess; and it is affirmed that, in one engagement, he slew forty-eight of the enemy with his own hand. In order to distinguish him from another person of the same name, and in reference to his readiness for any encounter, he was called by the soldiers *Aurelianus manu in ferrum*, "Aurelian with his hand upon his sword." He exercised the strictest discipline in the army; and punished with the utmost severity every neglect of duty, or instance of licentiousness in the conduct of his troops. He was capable of great generosity; but his stern justice often degenerated into savage cruelty; and he is ranked not so much among the good, as among the useful princes. See Gibbon's *Rom. Hist.* vol. ii. p. 15—56. *Anc. Un. Hist.* vol. xv. p. 449—464. Vopiscus, *Hist. Aug.* p. 210—225. (*q*)

AURENG-ZEBE, or AURUNGZEBE, the Great Mogul, and a successful conqueror, was born in the year 1618. He was the third and favourite son of Shaw Jehan, whom he succeeded in the empire of Hindostan. Aureng-zebe, from his youth, seemed destined to wield the sceptre of a mighty kingdom. With a boundless ambition, lurking under the appearance of unassuming humility, he possessed talents capable of directing it to the accomplishment of its object. He was well acquainted with the customs of his country. He knew that the princes of the blood must either look to sovereignty or death. No ties of kindred or humanity could save them from this alternative; the safety of the reigning monarch requiring the extirpation of all, who by their birth or power might compete with him in the empire. To lull the jealousy and suspicions of his elder brothers, he had assumed the habit and manners of a *Fakier*, a kind of religious mendicant. But while he was counting his beads, and appeared, to all around, indifferent about the concerns of a present world, he was devising means for procuring the interests of the nobles, and laying plans for possessing the throne. By his dutiful behaviour, and apparent submission, he had insinuated himself into the affections and esteem of his father, with whom he always held a secret correspondence. Dara, the eldest son of Shaw Jehan, alarmed at the growing interests of Aureng-zebe, and beginning to suspect that he had designs upon the throne, took every mean of thwarting his plans, and was often tempted to cry out, "Of all my brothers, I fear none but this *Namazi* (this great praying man)." Aureng-zebe had been appointed to the government of the Deccan, where he first shewed his warlike disposition, and his thirst for conquest. His first attempt was directed against the kingdom of Golconda, which he would undoubtedly have subdued, had it not been snatched out of his hands by the intrigues of Dara, who, apprehensive that such a conquest would render Aureng-zebe too powerful, persuaded Shaw Jehan to accede to an immediate peace. But the loss of territory was greatly compensated by the friendship of Meer Jumla, the greatest general of his age, who, offended at the ungrateful and unworthy treatment which he had received from the king of Golconda, his master, revolted to Aureng-zebe, and was the principal instrument in raising that prince to the throne of Delhi.

Shaw Jehan falling dangerously ill in 1656, a report of his death was spread abroad, which put the whole empire in commotion, and his sons immediately prepared for open war. All the abilities of Aureng-zebe were now called into action. He found himself unable to contend single-handed with Dara, who resided at court, and, possessing the ear of his father, could command all the resources of the empire. But what force could not obtain, might be accomplished by fraud. He wrote to his brother Morad, declaring that he, being a Fakier, had no desire to reign; and promising, that if he would join him with all the troops which he could raise in his government, he would place him upon the throne of Hindostan. Morad was ambitious, generous, and brave, but too imprudent and unsuspicious for the times in which he lived. Little suspecting the deceitful villainy of his brother, he immediately acceded to his wishes. They joined their forces on the banks of the Nirbidda, and accompanied by Jumla, hastened with all expedition to Agra. The mandate of his father met Aureng-zebe on his march, intimating his perfect recovery, and forbidding him to advance. Aureng-zebe pretended that this was merely a trick of his brother Dara; he swore that the letter was a counterfeit, and that his father was really dead. The imperial army under Dara was overthrown in the plains of Samonghes, and the victorious brothers stopt not till they reached the gates of Agra. Aureng-zebe now saw a throne at his disposal. He had gained over to his interest the chief omrahs of the empire; and none were allowed to enter the presence of Shaw Jehan without his permission. At the same time, he made great protestations of affection and submission to his father, and laid all the blame of what had happened upon the ambition and evil designs of Dara. He had as yet treated Morad with the affection of a brother, and the respect of a subject, always addressing him with the title of king. But the mask was soon to be withdrawn, and the hypocritical fakier was to appear in his real character. Morad having inadvertently drunk too much wine at an entertainment given by Aureng-zebe, fell asleep. While in this state, his servants were ordered to withdraw, and his sabre and poignard were secured. Aureng-zebe, who had retired early, now entered the chamber, and awakening his brother, upbraided him with his indiscretion and debauchery so unbecoming a king; then addressing his attendants, "Take this infamous drunkard; tie him hand and foot, and throw him into that room, there to sleep out his wine." The remonstrances of Morad were ineffectual. He was carried in chains to the fortress of Gualiar, where he soon after fell a victim to the fears of his brother. By the exertions of Jumla, Dara was also reduced to submission, and afterwards murdered; and his remaining brother Suja soon experienced the same fate.

Aureng-zebe was proclaimed emperor in 1659, during the lifetime of Shaw Jehan, whose pardon and paternal blessing he had obtained by his indulgent behaviour and respectful letters, but whose death neither increased nor diminished the power of Aureng-zebe. Securely seated on the throne of Delhi, there remained no competitor to dispute with him the empire; and for a period of nearly twenty years, the profoundest tranquillity reigned throughout Hindostan. The latter part of his life, however, was spent in constant activity and alarm. The rebellion of his sons, the revolt of some of the dependent provinces, and the insurrections of the Hindoos, whom he attempted to convert to Mahometanism, kept him almost continually in the field for the last fifteen years of his life. During that time he quelled a rebellion of the Rajapoots in Agimere; of the Patans beyond the Indus; and of the Jates in Agra: He reduced Bengal; annexed to his territories the Carnatic, with the kingdoms of Visiapour, Golconda, and Assam, and extended his authority over the whole peninsula within the Ganges. Aureng-zebe died 27th February 1707 at Ahmednagur, where he had taken up his winter quarters, in the 90th year of his age, and the 50th of his reign. His body, according to his own directions, was deposited in the cell of a holy dervise, near that city, in a plain tomb, without either pomp or ornament.

Destitute of that elegance of person, and winning behaviour, which instantly attracts our regard, Aureng-zebe acquired popularity by the decency of his character and the sanctity of his life. He was of a low stature, and slender make, with a large nose, and olive complexion. When the traveller Gemelli saw him in 1695, he was stooping with age, and supported himself on a staff. From the severe austerity of his manners, and his zealous endeavours in the cause of religion, his memory is held in great veneration by the Mahometans, and numerous pilgrims resort to Ahmednagur to pay their devotions at his tomb.

The character of Aureng-zebe has been drawn in very different colours. While some have represented him as a monster of cruelty, who waded to the throne through the blood of his family; who persecuted an inoffensive people from bigotry and hypocrisy; and whose remorse for his crimes was the bane of his future life: he has been painted by others as the greatest warrior and statesman which India ever produced; as having raised Hindostan to its highest glory; and as having lived and ruled for the happiness of his people. For our part, we agree implicitly with neither; and when we attempt to rescue his memory from the calumnies of the one, we must not be understood as acceding to the commendations of the other. In the government of Hindostan, where the succession to the throne is undecided by law, the death of the reigning monarch is always the signal for a civil war among the surviving branches of his family, and the safety of each depends upon the extinction of the rest. Aureng-zebe's severity to his brothers, therefore, was what the security of his person, and the tranquillity of the empire demanded, and can be viewed in no other light, than as a measure of self-defence,—a measure dictated by the urgency of the times, which his predecessors had taught him, and which succeeding monarchs have been compelled to imitate. His persecution of the helpless Hindoos, however it may call for our reprehension, must be attributed to the religion which he professed, and to the dictates of that prophet which he obeyed. But his hypocritical and perfidious treatment of the unsuspicious Morad, we can neither justify nor palliate. Though in Aureng-zebe we may discover much to blame, we find more to admire. If his obedience to the customs of his country have lowered him in our esteem, his abilities as a warrior and a statesman, claim our admiration, and we cannot refuse our praise to his strict observance of religious duties, to his mild and equitable distribution of justice, to the abstemious severity of his life; to that nobleness of mind, which made him disdain not to labour for his subsistence with his own hands; and to that benevolence and humanity of disposition, which led him to declare "that the food was bitter which was drawn from the sweat of his subjects." He never did an act of injustice till he aspired to the throne; and the moderation and equity of his government make us regret that he did not obtain it without a crime. His name will ever be revered in Hindostan, of which empire he may be said to be the real founder and legislator. See *Mod. Un. Hist.* vol. vi. p. 386—455. Gemelli *Trav.* apud Churchill's *Collect.* vol. iv. p. 232. Dow's *Hist. of Hindostan*, p. 218, &c. Rennell's *Memoir of a Map of Hindostan*, introd. p. 61—64. Fraser's *Hist. of Nadir Shaw*, &c. p. 29—39. (*p*)

AURIGA, or the WAGGONER, the name of one of the constellations in the northern hemisphere, containing 66 stars in the Britannic catalogue. (x)

Aurora Borealis.

AURORA BOREALIS, an extraordinary luminous appearance or meteor, shewing itself in the night-time, in northern latitudes, whence it has got its name of *northern lights*, or *northern dawn*. It is also known among the vulgar by the name of *streamers*, or *merry dancers*.

The aurora borealis may with propriety be distinguished into two kinds, the *tranquil*, and the *varying*. The tranquil shines with a mild and steady light, very much resembling the clearness of twilight; and preserves, for a considerable time, the form in which it first appears, with little or no variation. Different names have been given by the ancient philosophers to this kind of aurora, according to the forms which it assumes. They are thus enumerated by Muschenbroek: *Trabs*, or the *beam*, an oblong luminous tract, parallel to the horizon. *Sagitta*, the *arrow*, the same form with the beam, but terminating in a cusp. *Faces*, the *torch*, which has various positions in the heavens, but always one extremity larger than the other. *Capra saltans*, the *dancing goat*, a luminous appearance agitated by the wind, so as successively to appear and disappear. *Bothynoë*, the *cave*, a luminous cloud, having the appearance of a recess or hollow in the heavens, surrounded by a *corona*. *Pithiæ*, the *tun*, an aurora resembling a large luminous cask. These names, it is easy to perceive, are somewhat fanciful, and do not serve greatly to illustrate the nature of this singular meteor.

The *varying* aurora is still more remarkable in its appearance, and occasionally exhibits the most brilliant and rapidly diversified forms. It has been minutely described by Muschenbroek, who paid great attention to its peculiarities; and from whose description we select the following particulars. In that region of the air which is directly towards the north, or which stretches from the north towards the east or west, there appears at first a cloud in the horizon, which rarely rises to the height of 40 degrees. This cloud is sometimes contiguous to the horizon, sometimes detached from it; in which last case the intermediate sky appears of a bright blue colour. The cloud occupies a portion of the heavens extending in length from 5 to 100 degrees, and sometimes still farther. It is generally white and shining, but sometimes black and thick. Its upper edge is parallel to the horizon, bordered by a long train of light which rises higher in some places than in others. It appears also bent in the form of a bow, or like the segment of a sphere which has its centre considerably beneath the horizon; and sometimes a large white or luminous band is visible skirting the superior edge of the black cloud. The dark part of the cloud becomes white and luminous when the aurora has shone for some time, and after it has sent forth several bright and fiery rays. Then, from the superior edge of the cloud, there issue rays in the form of jets, which are sometimes many, sometimes few in number, sometimes close together, sometimes removed several degrees asunder. These jets diffuse a very brilliant light, as if a luminous or fiery liquor were driven with impetuosity from a syringe. The jet increases in brightness, and has less bulk at the place where it issues from the cloud; while it dilates itself and grows dimmer as it goes farther and farther off. Then there arises from a large opening in the cloud, a luminous train or column, of which the motion is at first gentle and uniform, and which increases in size as it advances. The dimensions and duration of these columns, however, vary considerably. Their light is sometimes white, sometimes reddish, or even blood colour; and, as they advance, their colours change, till they form a kind of arch in the heavens. When several of these columns, which have issued from different places, encounter each other in the zenith, they intermingle with each other, and form at their junction a small thick cloud, which seems as it were to kindle, and sends forth a light considerably more brilliant than that of any of the separate columns. This light changes to green, blue, and purple; and quitting its original situation, it directs itself towards the south, under the form of a small bright cloud. When no more columns are seen to issue, the cloud assumes the appearance of the morning dawn, and insensibly dissipates itself.—Musch. *Instit. Phys.* c. 41.

The duration of the aurora is very various. Sometimes it is formed and disappears in the course of a few minutes. At other times, it lasts during the whole night, or even for two or three days together; and Muschenbroek observed one in 1734, that lasted ten days and nights successively; and another in 1735, that lasted from the 22d to the 31st of March. The lucid columns are so transparent, that stars of the first and second magnitude are easily seen through them; these also frequently shine through the white border of the horizontal cloud, and sometimes, though rarely, through the opaque cloud itself. But many parts of the luminous substance are so thin, that the smallest stars which are visible to the naked eye may be distinguished through them.

In high northern latitudes, as those of Sweden, Lapland, and Siberia, the auroræ boreales are singularly resplendent, and even terrific. They frequently occupy the whole of the heavens; and, according to the testimony of Maupertuis, Middleton, Krafft, and others, eclipse the splendour of the stars, planets, and moon, and sometimes even of the sun himself. In the north-eastern districts of Siberia, according to the description of Gmelin, cited and translated by Dr Blagden, (*Phil. Trans.* vol. lxxiv. p. 228.) the aurora is observed to "begin with single bright pillars, rising in the north, and almost at the same time in the north-east, which, gradually increasing, comprehend a large space of the heavens, rush about from place to place with incredible velocity, and finally almost cover the whole sky up to the zenith, and produce an appearance as if a vast tent was expanded in the heavens, glittering with gold, rubies, and sapphire. A mor[illegible] beautiful spectacle cannot be painted; but whoeve[illegible] should see such a northern light for the first tim[illegible] could not behold it without terror. For, howev[illegible] fine the illumination may be, it is attended, as I ha[illegible] learned from the relation of many persons, with su[illegible] a hissing, cracking, and rushing noise through the [illegible] as if the largest fire-works were playing off. To [illegible] scribe what they then hear, they make use of the [illegible] pression *spolochi chodjat*, that is, the raging ho[illegible] is passing. The hunters who pursue the white [illegible] blue foxes in the confines of the Icy sea, are oft[illegible] overtaken in their course by these northern light—

The celebrated academician M. de Mairan, in 1731, published a treatise upon the aurora borealis, in which he ascribes this phenomenon to the impulse of the zodiacal light upon the atmosphere of the earth. The zodiacal light is a luminous train, which is visible at certain seasons, a little before sun-rise, or after sunset, in the shape of a pyramid or lens, stretching along the zodiac. It was first discovered by Cassini, who conceived it to be the atmosphere of the sun, formed by a very rare fluid luminous in itself, or illuminated by the sun's rays, but not equally throughout; being much more luminous, and more extended around the equator of the sun; in which direction it forms a very oblate spheroid, or rather lens, of which the transverse section coincides with the plane of the sun's equator. See ASTRONOMY *Index*.

" It is proved by observation," says M. de Mairan, " that this solar atmosphere extends sometimes as far as the earth's orbit, and even farther. When, therefore, it is at its greatest extent, the earth will be immersed in it; in which case a quantity of the luminous matter, influenced by gravitation, falls upon the earth's atmosphere, and descends more or less within it according to its weight; each luminous particle descending till it meet with a stratum of air, with which it will be in equilibrium. But as the equatorial regions have a greater centrifugal force than the polar, on account of their greater velocity during the earth's diurnal rotation, the luminous particles of the zodiacal light must be driven by this centrifugal force, from the equator towards the poles; and it is then that they form those luminous arches which we call the *aurora borealis*. (See *Tract. Phys. and Hist. del Aurore Bor.*) Besides this express treatise, there are several papers on the subject of the aurora borealis, by M. de Mairan, in the Memoirs of the French Academy; one in particular for the year 1733, in which he records a variety of his observations on the zodiacal light, made with a view to confirm his theory; and another for the year 1747, in which he defends his theory against the attacks of Euler, who wrote a treatise in order to refute it, and establish a new doctrine of his own.

Euler justly observes, that the theory of M. de Mairan is not only exposed to the objection of resting upon hypothesis, rather than upon observed facts, but that it is inconsistent with the direction in which the aurora is constantly observed to move; which is not from the equator towards the poles, but conversely from the poles towards the equator. He himself ascribes the aurora, not to the zodiacal light, but to the luminous particles of our own atmosphere, driven beyond its limits by the light of the sun, and sometimes ascending to the height of several thousand miles. This, it must be owned, is no very brilliant specimen of the philosophical acumen of this celebrated mathematician. See *Mem. Acad. Berlin*, 1746, p. 117.

As soon as the phenomena of electricity, and the laws by which they are governed, were tolerably understood, philosophers very naturally had recourse to this agent, as affording a satisfactory explanation of the aurora borealis. The brilliancy of its light, the rapidity of its motions, and the instantaneous changes of form which it underwent, all seemed plainly to point to this powerful element as the cause of these striking phenomena. Mr Hawkesbee, too, had very early shewn, that the electrical fluid assumes an appearance resembling the aurora borealis, when it passes through a vacuum or highly rarefied atmosphere. If a glass tube, resembling a Florence flask in size and shape, be exhausted of air by means of a stop-cock and syringe fixed to its mouth, and be then excited by friction, it will appear filled with a pale light, resembling the aurora borealis, which will go and come at intervals, sending forth brilliant flashes, exactly as this meteor does in the heavens. If either end of the flask be presented to the conductor of an electrical machine, the other being held in the hand, a constant stream of pale light will be transmitted through it, proceeding from the conductor. Mr Canton, also, contrived to exhibit an imitation of the aurora borealis, by means of electricity transmitted through the Torricellian vacuum, formed in a glass tube about three feet long, and hermetically sealed. When one end of the tube is held in the hand, and the other applied to the conductor of an electrical machine, the whole tube is illuminated from end to end, and will continue luminous for a considerable time after it has been removed from the conductor. If, after this, it be drawn through the hand either way, the light will be uncommonly intense, extending without the least interruption, from one hand to the other, even throughout its whole length. By this operation, however, a great part of the electricity is discharged; nevertheless the tube will flash at intervals, if held at one extremity and kept quite still; but if it be grasped by the other hand at the same time in a different place, strong flashes of light will hardly ever fail to dart from one end to the other, which will continue twenty-four hours and longer, without any fresh excitation. An arched double barometer, of a considerable height, exhibits these phenomena in a still more striking manner.

Thus we find that a small quantity of electricity, excited in a highly rarefied atmosphere, or in a medium approaching to a perfect vacuum, will exhibit luminous appearances entirely resembling the aurora borealis, for a very considerable space of time. With respect to the variations of colour which we find in the aurora borealis, these seem fairly ascribable to the different degrees of rarefaction of the air; for the same electricity which appears white in a very rare medium, becomes blue, purple, or red, in a medium of increased density; as is fully evinced by the following experiment. Let an electrical machine and an air pump be so disposed, that while the machine is worked a succession of strong sparks shall be communicated from the prime conductor to a metallic knob attached to the top of the receiver of the air pump. Let now the exhaustion of the receiver proceed, and we shall soon perceive the electricity forcing itself through the air within it, in a visible stream. At first this stream is of a deep purple colour; but, as the exhaustion advances, it changes to blue; and at length to an intense white, with which the whole receiver becomes completely filled.

This experiment would appear to establish the identity of the aurora borealis with electric light; and it may be mentioned as collateral proofs of this identity, that the atmosphere is found, by the electrometer, to abound with electricity when the aurora shines forth; that the aurora, when strong, is accompanied with the whizzing or crackling sound of electricity; and that the magnetic needle is evidently disturbed by the aurora, as well as by the action of an electrical machine, or by the natural electricity of a thunder storm.

But how, it may be asked, are all the subordinate phenomena of the aurora borealis to be accounted for by the action of electricity; and why is it circumscribed to the polar latitudes, and the more elevated regions of the atmosphere? Mr Canton conjectured, that the aurora borealis is occasioned by the flashing of the electric fire from positive towards negative clouds, at a great distance, through the upper part of the atmosphere, where the resistance is least. But were this all, the aurora ought to be as abundant in the tropical regions as in the polar; and it ought to dart in all directions, instead of uniformly pointing towards the zenith. Signior Beccaria, who paid very great attention to atmospherical electricity, supposed that there is a constant and regular circulation of the electric fluid from the north pole to the south; and he thinks that the aurora borealis may be this electric matter performing its circulation, in such a state of the atmosphere, as renders it visible on approaching nearer to the earth than usual. This supposition, however, is altogether inconsistent with Mr Forster's observations, already mentioned; according to which the columns of the aurora shot upwards from the horizon towards the zenith, as well in the southern as in the northern hemisphere.

The course of the aurora, therefore, is uniformly from the poles towards the equator; and supposing it to consist in a stream of electric light, the following reasons may be assigned for its constantly preserving this course. Extreme cold renders almost all bodies electric, or disposed to accumulate electricity; while heat and moisture occasion a conducting power. Air, when dry and cold, is powerfully electric; and hence the beautiful phenomena of the aurora are confined to the polar regions, and appear by night and not by day, and in winter rather than in summer. The inferior part of the atmosphere, between the tropics, is violently heated during the day time, by the reflection of the sun's rays from the earth, while the superior parts retain their original cold. It is also impregnated with moisture exhaled by the powerful heat which then acts upon the earth. It is therefore in the conducting state, and readily communicates the electricity of the superior regions to the clouds which float in it, or to the body of the earth. Hence the awful electrical phenomena of the tropical regions, exhibited in thunder and lightning, water spouts, whirlwinds, and the most tremendous tempests. The electrical fluid is thus conveyed in great quantities from the upper parts of the atmosphere between the tropics, to the lower stratum, and thence to the earth; and the inferior and warm atmosphere, having once exhausted itself, must necessarily be recruited from the upper and colder region.

These principles are greatly illustrated and confirmed by what happened to the French mathematicians, when stationed on the top of one of the Andes. They found themselves frequently involved in clouds, which, sinking down into the warmer air, appeared there to be highly electrified, and discharged themselves in violent tempests of thunder and lightning; while, in the mean time, on the top of the mountain, they enjoyed a calm and serene sky.

Thus, as the hot air of the torrid zone is continually bringing down vast quantities of electric matter from the cold air that lies directly above it, it follows, that the upper parts of the tropical atmosphere will continually require a supply from the northern and southern regions. Hence the constant electric current in the upper parts of the atmosphere, from the poles towards the equator; which in the colder regions, where the air is sufficiently rarefied, assumes the form of the aurora borealis and australis; and hence, this meteor is more frequent in winter than in summer; because, at that time, the electric power of the inferior atmosphere is greater, on account of the greater degree of cold; and it is in the night and not in the day time that it displays itself, because, during the day, the heat of the sun is sufficient to impart to every portion of the atmosphere a conducting power. With respect to the perpendicular direction which the streams of the aurora appear to assume, it need not be considered as a material difficulty; since, as Dr Halley has observed, they must dart from the pole in arches of circles of very great diameter, and consequently appear erect to those who view them from the earth's surface. The upper regions of the atmosphere, on account of their superior rarity, afford them the readiest passage, and hence they assume the perpendicular direction rather than any other.

Dr Franklin has given a different form to the electrical theory of the aurora borealis, supposing that the electricity which is concerned in this phenomenon passes into the polar regions, from the immense quantities of vapour raised into the atmosphere between the tropics; and that the light appears first, where it is first in motion, that is, in the most northern part; so that the appearance proceeds southward, though the fluid really moves northward. (*Exper. and Observ.* 1769, p. 49.) Mr Kirwan (*Irish Trans.* 1788) supposes, that the light of the aurora borealis and australis is occasioned by the combustion of inflammable air, kindled by electricity. He is of opinion, that a great quantity of this gas which is formed by a variety of natural processes, occupies the higher regions of the atmosphere, on account of its extreme levity; and is the cause of the auroræ, which are the highest of all meteors. But as far as we may trust to the observations of aëronauts, there is no evidence whatever, that inflammable air is more abundant in the upper, than in the lower regions of the atmosphere; and were it the cause of the auroræ, this meteor should abound in the tropical as well as polar regions.

With respect to the observation of Dr Kirwan, that the barometer commonly falls after an aurora, this is no more than what takes place also after a thunder storm; and its being followed by high winds from the south is as explicable on the electrical, as on the inflammable gas theory. Mr Winn, in the 73d volume of the *Phil. Trans.* makes the same remark, and says, that in 23 instances without fail, a strong gale from the south, or south-west, followed the appearance of an aurora. If the aurora were bright, he says the gale came on within 24 hours, but was of no long continuance; if the light was faint and dull, the gale was less violent, and longer in coming on; but longer also in duration. His observations were made in the English channel, where such winds are very dangerous, and by attending to the auroræ, he says, that he often escaped shipwreck, while others suffered. As we have supposed a stream of electricity to be constantly passing through the mass of the earth, from the equator towards the poles, it is evident, that a wind may be occasioned by this electricity finding a ready vent at some promontory, or head-land. And should we suppose one of those vents situated on the coast of France, or in the Bay of Biscay, the electric matter that has been received at the equator, during an aurora borealis, will be discharged there, for some time after; and consequently will occasion a wind from that quarter, which will be south-west in the English channel. According, however, to the different situations of these electrical vents, winds may blow in very different directions in different quarters of the world.

The most unaccountable of all the circumstances respecting the aurora borealis, is, that it is not much more than a century since this phenomenon has been observed to occur with any degree of frequency in our latitudes. We find indeed a few remarkable atmospheric phenomena recorded by the ancients, which may be reckoned examples of this meteor, viz. in Aristotle's *Meteor.* l. i. c. 4, 5.; and Senec. *Quest. Nat.* l. i. c. 15. Pliny also (l. ii. c. 27.) speaks of a bloody appearance of the heavens, which seemed like a fire descending upon the earth, seen in the third year of the 107th Olympiad; and of a light seen in the night-time, equal to the brightness of day, in the consulship of Cæcilius and Papyrius (l. ii. c. 33.) both which may be referred to the aurora borealis. But, with such trifling exceptions as these, the whole of antiquity is absolutely silent on this subject. Dr Halley informs us, that he had begun to despair of witnessing this beautiful phenomenon, when the remarkable aurora of 1716 made its appearance. This philosopher has given us a historical detail of the several observations of this meteor, in which he says, that the first account of it upon record, in an English work, is in a book entitled, *A Description of Meteors*, by W. F. D. D., reprinted at London, in 1654, which speaks of "burning spears" being seen Jan. 30. 1560. The next appearance of a like kind is recorded by Stow, and occurred on October 7. 1564. In 1574, according to Stow and Camden, an aurora was seen for two successive nights, viz. the 14th and 15th of November. The same phenomenon was twice seen in Brabant in 1575, viz. on the 13th of February and the 28th of September; and the circumstances accompanying it were described by Cornelius Gemma, who compares them to spears, fortified cities, and armies fighting in the air. In 1580 and 1581, this phenomenon was repeatedly observed at Baknang, in the county of Wirtemberg, in Germany. But from this time to 1621, we have no such phenomenon on record, when it was seen all over France on September 2., and is particularly described by Gassendi in his *Physics*, under the title of *Aurora Borealis.* In November 1623, another was seen all over Germany, and is particularly described by Kepler. Since that time, for more than eighty years, we have no account of any such phenomenon being observed; but in 1707, Mr Neve observed one of short continuance in Ireland; and in the same year, a similar appearance was seen by Romer at Copenhagen; while, during an interval of eighteen months, in the years 1707 and 1708, this sort of light had been seen no less than five times. The aurora of 1716, which Dr Halley particularly describes, was remarkably brilliant. It was also visible over a prodigious tract of country; being seen from the west of Ireland to the confines of Russia, and the east of Poland; extending near 30° of longitude, and from about the 50th degree of north latitude, over almost all the north of Europe; and in all places exhibiting, at the same time, appearances similar to those observed in London.

It appears, then, to be certainly established, that the aurora was of very rare occurrence in our latitudes till about a century ago; for it cannot be supposed that so beautiful and striking a phenomenon would have passed unnoticed, and unrecorded, during the two preceding centuries, while men of science, and particularly astronomers, were so busily employed in examining every remarkable appearance of the heavens; or that the philosophers of Greece and Rome would have remained silent concerning so beautiful a meteor, had it been in any degree familiarly known to them. It is in vain to account for their silence by saying, that they inhabited latitudes which are scarcely ever visited by this appearance; for the Romans not only visited, but long resided in the north of Germany, and in Britain, where the aurora is now frequently seen in great splendour.

The following ingenious theory has been proposed, with a view to resolve this difficulty. There is a very remarkable analogy between the phenomena of electricity and those of magnetism, and, apparently, an intimate dependence of the one upon the other. There are two species of electricity, a positive and a negative, and two species of magnetic polarity, a north and a south. A body positively electrified repels another body positively electrified, and attracts one that is electrified negatively; while the north pole of one magnet repels the north pole, and attracts the south pole of another. The electric shock will deprive a magnetic needle of its power, or communicate it to it again, according to the direction in which it is laid; and, during a thunder storm, the magnetic needle is observed to be powerfully agitated. Thus the intimate connection between electricity and magnetism seems to be satisfactorily established. Again, that imaginary line, or circle, which traverses the earth irregularly from the north towards the south, and is called the *line of no variation*, because the magnetic needle, when placed upon it, points truly to the poles, is observed to have a gradual, and pretty regular, revolution around the earth, performed in about 1000 years; so that, when 1000 years have elapsed, the line of no variation will have reached the same situation which it occupied at the beginning of that period. This line seems to have a sort of controul over the corruscations of the aurora, which are observed to follow its direction in the heavens, and, as it were, to be attracted towards it, and regulated by its influence in their course.

But it appears, by calculation, that during the scientific age of Rome, the only period at which accurate observations of the phenomena of the heavens could be made and recorded, the line of no variation run across the continent of Europe; and consequently the aurora borealis, or stream of electrical matter that passes from the north pole towards the equator, would find a ready vent from the earth into the sky, through the mountains, and other pointed bodies which are so plentifully scattered over the land. By thus flowing constantly, and so greatly subdivided, it could not give rise to any striking atmospheric phenomena. At present, the direction of this line is through the Atlantic ocean; and of consequence, the electricity of the polar regions is not imperceptibly transmitted to the atmosphere, but proceeds in such masses, and at such irregular intervals, as to exhibit itself in the beautiful phenomena of the northern lights. A thousand years ago the line of no variation, no doubt, occupied the same situation as it does at present; and the aurora then shone forth in all its splendour; but, at that period, the nations of Europe were sunk in ignorance and barbarism; and whatever phenomena the heavens presented were lost to posterity, from the rudeness and want of knowledge of the people of that age. Thus, if this theory be true, when the line of no variation shall again pass over the land, the aurora borealis will become invisible for a time; and when this line reverts to its present situation over the ocean, the aurora will once more shine forth with its wonted lustre. (*m*)

A new theory of the aurora borealis has lately been proposed by M. Monge. He imagines that this phenomenon is merely clouds illuminated by the sun's light, which falls upon them after numerous reflections from other clouds placed at different distances in the heavens. If we suppose that clouds placed in the atmosphere are enlightened by the direct rays of the sun, and reflect the light which they receive to other clouds, situated in a part of the heavens deprived of the direct light of the sun, and if we suppose this light to be necessarily reflected to other clouds, we shall have some idea of the possibility of a mass of thin clouds being illuminated by the sun when this luminary is considerably depressed below the horizon of the spectator. The intensity of these radiations will depend on the dispersion and absorption of the light in its successive reflections, and it will be more distinctly perceived when the rest of the atmosphere is involved in darkness. Upon this hypothesis, Monge has explained why the phenomenon is perceived near the poles, and why it is most frequently seen between the vernal and autumnal equinoxes. See *Leçons de Physique*, par Pujoulz, 1805. p. 237.

Another theory of this singular phenomenon has been recently proposed by M. Libes. It is founded on the following principles. 1. If the electric spark is passed through a mixture of azotic and oxygen gas, nitric acid, nitrous acid, or nitrous gas, will be produced, according to the proportion which exists between the azot and oxygen. 2. The nitric acid exposed to the sun, becomes more coloured and volatile. If a receiver is placed over a vessel containing this acid, exposed to the rays of the sun, the acid will in a few minutes become coloured, and the receiver will be filled with red and volatile vapours, which continue for a long time, and exhibit a brilliancy resembling the aurora borealis. 3. In the flasks which contain the nitrous acid, there is always above the acid, a red and volatile vapour, which is never condensed. 4. Nitrous gas, in contact with atmospheric air, exhales red vapours, which fly away in the atmosphere. 5. The hydrogen gas which disengages itself from the surface of the earth, rises to a height in the atmosphere corresponding with its specific gravity. 6. The heat of the sun is extremely feeble in the solar regions. From these principles, M. Libes concludes, that there is very little hydrogen produced in the polar regions, and that therefore there is almost none of this substance in the higher regions of the atmosphere. The electric fluid, therefore, passing through a mixture of azot and oxygen, will produce, nitric acid, nitrous acid, or nitrous gas, and these substances, acted upon by the solar rays, will exhibit those red and volatile vapours, which form the aurora borealis. A more complete account of this ingenious theory may be found in the *Traite de Physique*, par Libes, or in the *Dictionnaire de Physique*, of the same author; and in Rozier's *Journal*, June 1790, Feb. 1791, and vol xxxviii. p. 191.

The latest theory which has been employed to account for the aurora borealis is that of our ingenious countryman Mr Dalton, who considers it as a magnetic phenomenon, whose beams are governed by the magnetism of the earth. He supposes that these beams are cylindrical portions of a magnetic fluid, which are actually parallel to the dipping needle, and therefore appear to converge to the magnetic pole; and that the light is produced by the transmission of electricity, which disturbs their magnetic properties. Mr Dalton observes, that the luminous arches are always perpendicular to the magnetic meridian; and that, from the permanency of their form, they afford an opportunity of determining the height of the meteors. From an observation on a base of 22 miles, he found its altitude to be about 150 miles. See Dalton's *Meteorological Observations and Essays*, 1793, p. 54. 153.

The Abbe Bertholon ascribes the aurora borealis to a phosphorico-electric light. A full account of this theory has been given by its author in the *Encyc. Method.* art. AURORE.

Much interesting information respecting the aurora borealis, will be found in the following works:—Muschenb. *Instit. Phys.* c. 41. *Tract. Phys. et Hist. de l'Aur. Bor.* par M. de Mairan, Paris, 1754, 9to. Beccaria *Dell. Electricismo Artif. et Nat.* p. 221. Smith's *Optics*, p. 69. D'Alembert's *Opuscules Mathematiques*, vol. vi. p. 334. *Phil. Trans.* 1716, p. 406; 1717, p. 584, 586; 1719, p. 1099, 1101, 1104, 1107; 1720, p. 21; 1721, p. 180, 186; 1723, p. 300; 1724, p. 175; 1726, p. 128, 132, 150; 1727, p. 245, 253, 255, 301; 1728, p. 453; 1729, p. 137; 1730, p. 279; 1731, p. 53, 55; 1734, p. 243, 291; 1736, p. 241; 1740, p. 368; 1741, p. 744, 839, 840, 843; 1750, p. 319, 345, 346, 499; 1751, p. 39, 126; 1762, p. 474, 479; 1764, p. 326, 332; 1767, p. 108; 1769, p. 86, 367; 1770, p. 532;

1774, p. 128; 1781, p. 228; 1790, p. 32—47, 101. *Miscell. Berolinens.* 1710, vol. i. p. 131. *Comment. Petrop.* tom. i. p. 351; iv. p. 121. *Acta Petropol.* 1780, vol. iv. p. 1. *Mem. Acad. Par.* 1747, p. 363, 423; 1731; 1751. *Mem. Acad. Berl.* 1747, p. 117. *Schwed. Abhandlungen*, 1752, p. 169; 1753, p. 85; 1764, p. 200, 251. Bergman *Opusc.* vol. v. p. 272. *Americ. Trans.* vol. i. p. 404. *Mem. de Mathemat. et Phys.* tom. viii p. 180. *Rozier*, vol. xiii. p. 409; vol. xv. p. 128; vol. xxxiii. p. 153. Franklin's *Works*, vol. ii. Weidler *De Aurora Boreale.* Nocetus *De Iride et Aurora Boreale* cum Notis Boscovich, Rome, 1747. *Mem. Soc. Ital.* vol. vii. p. 153. Gilbert's *Journal*, vol. xv. p. 206. But particularly, Dr T. Young's *Nat. Phil.* vol. i. p. 687, 716; and vol. ii. p. 488. (*m*) (*o*)

AUSONIUS, Decimus Magnus, a Latin poet, was the second son of Julius Ausonius, an eminent physician at Bourdeaux. He was born early in the fourth century; and his grandfather, a firm believer in astrology, having calculated his horoscope, flattered his family with the hope that the child was destined to rise to the most honourable elevation. His uncle, Æmilius Magnus Arborius, a professor of rhetoric at Thoulouse, took a particular charge of his education, and the pleasure of witnessing the uncommon progress which he made in the liberal arts. At the age of thirty he was appointed to the useful station of teacher of grammar, and soon after to that of teacher of rhetoric, in his native city. In this comparatively obscure situation, he conducted himself so much to the satisfaction of his employers, that his high reputation extended to Rome, and he was chosen by the Emperor Valentinian to direct the studies of Gratian, his son. He had the good fortune, or rather the address, to make himself equally acceptable to his pupil and to the emperor; both of whom loaded him with honours, as a remuneration for his valuable services. During the life of Valentinian he was appointed quæstor; he was afterwards advanced to the prætorian præfecture of Italy and Gaul; and, in 379, he was raised to the consulship, an office which the emperors generally conferred on their minions, but which, in this instance, was filled by a man, whose mental superiority enabled him to dictate to his master. The composition in which he testified his gratitude, (*Actio Gratiarum*) is commonly accounted a proof of great liveliness and vigour of mind in a man far advanced in years; but Gibbon more justly characterises it as "a servile and insipid piece of flattery, which has survived more worthy productions." He died at a great age, towards the close of the fourth century. Theodosius had so great a respect for him, that, according to some authors, he promoted him to the patrician dignity; and it is certain, that the solicitation of this accomplished emperor induced him to publish his poetical works.

What was the religion of Ausonius has been much disputed. Vossius, and some other writers, whom Gibbon has followed, have no hesitation in pronouncing him a pagan. But Paulinus, bishop of Nola, who had been his pupil, speaks of him as a Christian. Yet, in his own writings, we can discover no internal evidence that he had adopted the true faith. In some of his verses he appears to be sceptical on the subject of a future life; and some others, written by command of Valentinian, are so indelicate and licentious as to render it questionable if their author had any sense of religion at all. See *Mem. de l'Acad. des Inscript.* tom. xv.; and Bayle, *Dict. Histor. et Crit.*

His poetical character has generally been overrated. His productions rise above mediocrity. Most of the subjects are ephemeral; and the execution bears evident marks either of negligence or affectation. His genius is undisputed; but long before his time the taste of the Romans had degenerated; and it is enough to say of Ausonius, that, in sentiment and diction, he rises above the ordinary level of his contemporary rivals. One of the best editions of his works was published at Paris in 1769, in four volumes 12mo, with a French translation. (λ)

AUSPICES, the observations taken by the Roman augurs from the flight of birds, and other natural appearances. The words *auspicy* and *augury* are often used indiscriminately; but the common opinion is, that the former originally signified the inspection of birds for the purpose of divination, whereas the latter consisted in a skilful attention to their voices. The name *auspex* was applied to any person who interpreted omens; but the name *augur* was not extended to any but the members of the sacred college.

Auspices were anciently consulted on almost every occasion of importance, particularly on the election of magistrates, and at the commencement of military expeditions. The *comitia centuriata* and *curiata* could not legally meet, till he who was to preside, accompanied by an augur, had solemnly taken the auspices. Two kinds of auspices were chiefly attended to before the assemblies were held: those which were taken from the contemplation of the heavens; and those which were taken either from the *oscines* or the *præpetes*, birds by whose singing or flight the will of the gods was supposed to be indicated. On these occasions the augur could prevent a meeting, or he could require a delay; or, by declaring that some mistake had been committed, he could not only dissolve an assembly after it was regularly convened, but oblige a magistrate at any time to resign his office, on account of the alleged informality. In later times they were by no means so scrupulous with regard to the forms. The augurs were in the constant habit of declaring that they saw lightning on the left, and the falsehood of the assertion did not vitiate the election.

In the time of war, auspices were taken *ex acuminibus*, from the beaks of birds; and whenever a general was about to lead his army across a river, he took the *auspicia perennia*, or *peremnia*. Every militar[illegible] enterprise was said to be accomplished by the *au[illegible]pices* of the consul or commander in chief.

The solemnities most commonly observed wh[illegible] the auspices were taken, have been shortly describ[illegible] in the article Augury. See also Divination. (λ)

AUSTERLITZ, a small town of Moravia, [illegible] the circle of Brunn, celebrated for a dreadful ba[illegible] which was fought in its vicinity, on the 2d Dece[illegible]ber 1805, between the French and the allied Russi[illegible] and Austrians. This bloody engagement, which [illegible]minated in favour of the French arms, decided [illegible] campaign, and peace was signed at Presburg, on [illegible] 26th of the same month. The Russians, who suff[illegible] ed chiefly, are said to have lost 15,000 killed and wounded, and 100 pieces of artillery. This conflict has been called by the French the Battle of the Coronation, as it was fought on the anniversary of Bonaparte's coronation; and the Battle of the three Emperors, from its being attended by the emperors of the three contending powers. (*j*)

Austin.

AUSTEL, Austil, or Austle, a market-town of England, in the hundred of Powder in Cornwall. This town, which is built on the side of a hill, and stands nearly in the centre of the county, has for some time been in a flourishing state, from its being the seat of one of the stannary courts, and from the great turnpike road from London to the Land's End, which passes through it. In the vicinity of the town are several tin mines, and also quarries of porcelain, which is sent to Liverpool, Bristol, and Staffordshire, for the use of the potteries. The inhabitants are chiefly employed in the mines, in the pilchard fishery, and in a manufactory of coarse woollen cloths. Number of houses 663; population 3788, of whom 390 are employed in trade. See *Beauties of England and Wales*, vol. ii. p. 422.; and Polwhele's *History of Cornwall.* (*j*)

AUSTIN, Saint. See Augustine.

AUSTRALASIA.

Australasia.

A vague and indistinct idea long prevailed among the more enlightened European nations, that an immense continent existed at the south pole of the world, which they denominated *Terra Australis Incognita*. This, from the capes and islands casually seen by navigators, was supposed to extend over many degrees of the polar regions; and sanguine hopes were indulged, that in future periods its shores might be visited and surveyed in safety. Later researches, however, have proved the fallacy of these expectations: they have ascertained, that if there is any continent, it can be only of a limited size, and that it is guarded on all sides by an impenetrable barrier of ice. Modern geographers have nevertheless testified an inclination to subdivide the vast expanse of southern hemisphere explored in voyages undertaken to discover the *Terra Australis*, and to call one portion of it by the new appellation of *Australasia*. We acknowledge that we entertain considerable doubts of the expediency of this improvement on geographical nomenclature, and we also hesitate in admitting the proposed division as the best that can be made; for we cannot help suspecting, that the readiness evinced to receive it, arises less from a conviction of its utility, than from that propensity to innovation in nomenclature, which is now so prevalent, and which has plunged entire sciences into absolute confusion. Although we may justly question, whether the establishment of boundaries, by lines drawn through a trackless ocean, can prove of material advantage, we agree, that the concentration of our views, by any striking limits, cannot fail to be beneficial; especially when the judgment is liable to be distracted by a great variety of objects presented without order or arrangement. Australasia, according to the proposed division, extends from 3° of north latitude to 50° south, and from 95° of east longitude to 185°; thus comprehending a surface of 5000 miles in length, by about 3180 in breadth. Geographers, however, have not yet condescended on the exact limits under which it is to be included, particularly towards the north-eastern parts; and therefore though we have assumed the same boundaries that some of the latest authors have done, yet we do not consider them as by any means completely fixed.

Origin of the name.

The name Australasia is said to have been originally proposed by M. de Brosses, a skilful geographer; who meant to comprehend under it the countries south of Asia, including New Holland, New Zealand, and New Guinea. This suggestion proceeded, in a great measure, from the belief of a southern continent towards the pole being still undiscovered; but, independent of this circumstance, his reasons bear much weight when considered in another point of view: "In the immense extent of regions about to be exposed," he observes, "how various are the countries, the climates, the manners, and races of men. Were not some fixed points assumed from place to place, our judgment would be bewildered. Divisions, relative to the progress of our knowledge, and also preserving due regard to physical circumstances, should be laid down. Four great portions of land, Europe, Asia, Africa, and America, constitute the world: and there are three wide extents of ocean, the Indian, or Ethiopic; the North, or Atlantic; and the South, or Pacific. The unexplored southern regions may be divided into three portions, corresponding to them; each division being to the southward of one of the three portions of land. That to the south of Asia, in the Indian Ocean, I shall, on this account, call Australasia." A fifth part of the world would thus be constituted, bearing a reasonable proportion in size to the others in point of the land it contained. De Brosses had also proposed another subdivision of the southern hemisphere, which would have further contributed to preserve equality.

Countries included.

Australasia, according to the limits which we now ascribe to it, is larger than the whole of Europe. The principal countries it includes are,—1. The immense island, if it may be called such, of New Holland, nearly 2000 miles in breadth, and almost 1700 in length; 2. Van Diemen's Land; 3. Papua, or New Guinea; 4. New Britain, and New Ireland; 5. The Arsacides, or Solomon's Islands; 6. New Caledonia; 7. New Zealand. Besides these, which present the most prominent terrene objects in Australasian geography, there are hundreds, probably thousands, of smaller and detached islands, many of which have never been accurately surveyed, and it is highly probable that some are still unknown. Compared with all the other land in Australasia, New Holland may safely be calculated of tenfold greater size; and it is likely that three-fourths of the whole regions consist of water. Nevertheless, we may deem the views of the older geographers as in some part fulfilled, by including such extensive tracts of land in Australasia.

Here we shall take a brief retrospect of the progress of discovery of the various countries comprised under this general denomination; treating, in the first place, of what was known previous to the commencement of the eighteenth century; and then we shall draw some general conclusions concerning the products of Australasia, and the manners of the natives. The different properties of the countries, and their inhabitants, will be resumed, in greater detail, under other articles of our work.

Progress of discovery. 1500-1700.

The extent and importance of New Holland justly claim priority of consideration, though we possess no evidence in favour of its being earlier known than the rest; which leads us to remark, that more of the Australasian countries than one having been recognised during the same voyage, we are precluded from observing that strict chronological order which is so desirable in historical inquiries. The discovery of New Holland has commonly been ascribed to Dutch navigators of the seventeenth century. M. de Brosses refers it to an earlier period, judging it probable that it was discovered by *Paulmyer de Gonneville* in 1503, who sailed from Honfleur in June of that year. Off the Cape of Good Hope he was assailed by a furious storm, in which he lost his reckoning, and was driven into an unknown sea. As he saw the birds flying from the south, he sailed towards that quarter, and reached an extensive country, which he called Southern India. There he spent six months, refitting his vessel, and lived on friendly terms with the inhabitants. On comparing the meagre accounts which he gives of their manners, and those of any of the Australasians according to the earliest narratives, we conclude that they are of a different race, and had made much greater advancement in civilization. A set of maps, constructed in the year 1542, or perhaps earlier, has been lately found, wherein some part of New Holland is supposed to be laid down. But we are so little acquainted with these maps, that we cannot venture to maintain an opinion concerning them: at the same time we ought to remark, that repeated instances occur, as will be seen in the course of this article, where later navigators claim the merit of discoveries which belong, so far as we can judge, to those who have lived centuries before them.

Gonneville.

Early in the seventeenth century, the Spanish navigator Quivos is conjectured to have seen the north, or north-east coast of New Holland. In the year 1606 he traversed the Australasian seas, with a fleet under his command; and, on attending to his tract, the fact is far from improbable. But the Dutch were the first who became acquainted with any extent of coast, or the nature of the country. Soon after Quivos left that region, they made several successive voyages to it, and gave those names to the north and western parts of New Holland which are retained to the present day. Doubts were started, whether any of them effected a landing previous to Pelsart, in 1629. These have been removed by the French finding a tin platter on an island called Dirk Hartigh's Island, close to New Holland, in 1801, which bore the following inscription rudely graven: "1616, On the 25th of October, the ship Endraght of Amsterdam arrived here; first merchant Gilles Miebais Van Luck; Captain Dirk Hartighs of Amsterdam. She sailed on the 27th of the same month. Bantum supercargo; Janstins chief pilot; Pieter Ecoores Van Bue....... year 1616." Hartighs'* vessel was on a voyage to India at the time of touching on the coast, which in the Dutch charts is called *Landt* D'Eendraght. As the inscription ascertains the name of his vessel, what is called the *Concord's Coast* probably received that appellation from some other vessel in company, or from some future navigator, contrary to general belief. In 1618, another Dutchman, Zeachen, ran along the north coast of New Holland, which was then, or soon afterwards, called Arnheim, or Van Diemen's Land; and several of his countrymen, in the years immediately subsequent, extended the knowledge of this great island. Edel's Land was called after a navigator of that name in 1619; Leuwin's Land was discovered in 1622; and Peter de Nuytz, in a vessel named the Golden Horse, fixed the position of different points in 1627, which the latest voyagers acknowledge to be uncommonly correct. William de Wit, Vianen, and Carpenter, a Dutch general, were on the south and west coasts in 1627 and 1628. In the subsequent year, Francis Pelsart, commanding a ship, which was separated in a storm from ten others, approached the west coast of Holland. There, in lat. 28° south, he was cast away on Frederic Houtman's Shoals, which the French affirm are about eight leagues from the main land. The crew and passengers were saved by the boats, and carried to a small island, about three leagues distant, which we apprehend to be the island Turtle Dove; but finding no water there, Pelsart examined a number of others, where he got some in the cavities of the rocks, though unfit for use. A few days afterwards, having put a deck on his boat, which was unable to stand the sea, and having ascertained the position of the islands to be 28° 13′ south, he stood on for the land. Stormy weather and a rocky shore prevented him from landing from the 9th of June to the 15th. In 22° 17′ south latitude, he saw the savages at a distance, who fled whenever he and his people approached; and he found the remains of their provisions beside fires on the beach. Circumstances, which it is unnecessary now to recapitulate, induced Pelsart to run for the coast of Java, which he saw on the 27th. Having obtained assistance from Batavia, he returned to the island in September, and brought away the survivors of the shipwrecked persons. Most of those who had escaped the shipwreck had been cruelly murdered by means of the supercargo. The chief discoveries which the Dutch made in Australasia during the seventeenth century, were those by Abel Jansan Tasman, in 1642; and the large island, or continent, of which we speak, received the name of New Holland in 1644. Tasman sailed from Batavia in August 16 with two vessels under his command, the Heemsk and Zeehaan. On the 24th of November, when

Hartighs.

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* We are unable to ascertain the real orthography of this navigator's name, whether Hartig, Hartighs, Hertog, or Hertog

part of the Papuan territories in 1537 or 1538, where, it appears, they lost a vessel, and were made prisoners by the natives. Some of them were carried thence to the Moluccas, and there ransomed. Villalobos. Ruy Lopez de Villalobos ranged along the same coasts in 1543, when, ignorant of its having before been visited by Europeans, he conferred upon it the name of New Guinea. The country had an inviting appearance; and he anchored in several ports, where he obtained wood and water. Previous to reaching New Guinea, he fell in with an archipelago of islands, among which, it has been conjectured, the Spanish vessel was lost; we should consider it, however, to have been farther to the east. Le Maire, Schouten. In 1616, James le Maire and William Schouten, both skilful navigators, in a voyage from the east, approached the coast of Papua. They anchored in a bay, where two villages stood on the shore, and had different interviews with the natives, from whom they obtained small quantities of provisions. They were remarkably diseased, not one being seen without lameness, blindness, or some other personal defect, which Le Maire and Schouten ascribed to the unhealthiness of the climate, as their houses stood eight or nine feet above the ground on posts. "These people," he observes, "are the true Papoos, with black, short, and curled hair, wearing rings in their ears and noses, and necklaces of hogs tusks: a wild, strange, and absurd people, curious to see every thing, and active as monkeys." Alvaro Mendana probably saw some of the islands near Papua, in 1595; also Tasman in 1642, and Dampier in 1699. Geographers have supposed, that what is described by both these authors as Papua, was in fact New Britain; and that Dampier, in particular, never landed on that island.

New Britain was certainly discovered by this latter navigator in 1699. Ranging along the coast to the most eastern part of New Guinea, he found it interrupted, and a lesser division, being an island, he called it New Britain. It may be productive of rich commodities, he says, and the natives might easily be brought to commerce. Owing to inconveniences which are specified by him, his voyage of discovery was soon abandoned. If New Ireland was known in the seventeenth century, it had then been very little explored. Mr Dalrymple, if we rightly understand his arguments, conceived the New Britain of Dampier to be the same as the Solomon Islands.

No part of all the Australasian regions has been the subject of greater doubt or controversy than the Arsacides, or Solomon Islands. Even their existence was long denied after the original discovery, whence their history afterwards became an interesting topic of investigation. Mendana. During the course of a voyage by Alvaro de Mendana, from Lima, in South America, for the purpose of discoveries in the South Sea, in the year 1567, he fell in with a great shoal in Australasia. This he called *Baxos de la Candelaria*, or Candlemas Shoal, which name it yet retains: it extended fifteen leagues, and the middle lay in 6° 15′ south latitude. Mendana next fell in with a large island, and several smaller ones, where, finding good materials, he built a brigantine, which he sent out on further discoveries. Other islands were discovered and examined; and he named the first whereon he had landed *Ysla Isabel*. In consequence of a design entertained by the Spanish government in South America, of establishing a settlement in Australasia, Mendana sailed on another voyage with four vessels in 1595. His discoveries among the islands had been considerable, owing to his residence there, and the services of the brigantine. In the course of again endeavouring to find them, he discovered an island to the eastward, which he called *Santa Cruz*, now known by the name of Egmont's Island. Viewing it as a suitable place for a colony, he landed and built a town, after slight rencounters with the natives. Mendana found means, however, to conciliate their friendship, and they supplied the colony with provisions; but an unlucky misunderstanding arose, when the chief was killed, and many misfortunes befell the Spaniards. Mendana soon afterwards died, and was interred in the church of the town which he had founded. The government devolved on his wife, who, deeming it expedient to abandon the settlement, sailed in quest of the Solomon Islands. After making an unsuccessful search for two of the principal islands, the people on board became impatient, and, the vessels then altering their course, bore away for Manilla; and the governess thence sailed for New Spain. The result of Mendana's second voyage produced much embarrassment, for it was justly thought very extraordinary, that a number of islands, whose position had been specified with tolerable accuracy, could not be found again.

New Caledonia was not known at the period of which we are now treating, as it belongs to the discoveries of the eighteenth century; but the New Hebrides were known to Quivos in 1606. One of the islands was then called Manicolo, or Mallicolo, by the natives of the vicinity, as it is at the present time; and it is evident that he not only landed on the largest, but visited others in the vicinity.

New Zealand was discovered by Tasman, the navigator whom we have already named. On the 5th of December 1642, while searching for Solomon's Islands, he was obliged to alter his course, and on the 13th came in sight of a very high and mountainous country, which he believed the Terra Australis. He called it Staaten Land, and anchored in a bay on the north-east, where he had an interview with the natives. Supposing that a friendly intercourse could be carried on with them, he prepared to land; but a treacherous attack was made on him, wherein he lost several men, and thence called the place of his anchorage Murderer's Bay. He traversed some of the coast, which was of a pleasing and fertile appearance, and next stood to the northward, discovering some small islands in his way. This portion of Australasia is now called New Zealand.

Although many islands, rocks, and shoals, were noted by the old navigators, we see, in this cursory retrospect, how very limited the knowledge of the Australasian regions was previous to the eighteenth century. There is a possibility that New Holland was discovered before the year 1600, but it is [illegible] yet supported by unquestionable evidence. In the subsequent century, various vessels had visited some portions of its coasts; and Van Diemen's Land which had been observed to the south, was judged as the men in appearance. In May M. de Bougainville sailed along the north coast of an extensive land, low, and covered with trees. Many natives were seen on the beach, but although some canoes put off, none would venture on board his vessels. The French, however, prepared to land in a beautiful bay, on which they were attacked by the inhabitants, whom they treated with much rigour in retaliation. M. de Bougainville, ignorant that this part of Australasia had been already visited, and having found a number of islands lying near each other, called the whole the *Archipelago of the Great Cyclades.* The more extensive coast was afterwards proved to be the *Tierra Austral del Espiritu Santo,* where Quivos had remained a month. Warfare seemed to pervade these islands, as the natives would part with none of their arms except a few arrows.

M. de Bougainville, in a north-west course from the Tierra Austral del Espiritu Santo, discovered a new region of Australasia. His approach to the land was indicated by a delightful odour in the night, and in the morning a beautiful country was disclosed to view, consisting of plains and groves extending along the shores, and lofty mountains of different elevations in the interior. He was prevented from visiting so desirable a country, bearing every mark of riches and fertility, for both disease and famine had reduced his crew. Standing along the south shore, he saw several islands, and after doubling a cape on the east, he called the land *La Louisiade.* Here, for the sake of preserving connection, it may be remarked, that our present knowledge of Louisiade is infinitely more imperfect than of most other Australasian territories. Since that period it has seldom been recognised, and some geographers have supposed it an extension of the coast of Papua. Two French vessels, the *Boussole* and *Recherche,* traversed the north coast in 1793, but except in ascertaining that there were numerous flats, shoals, and islands indistinctly characterised, no important discoveries were made. The natives had woolly hair and olive coloured skins: they were stark naked, excepting a kind of girdle, and large leaves before. Some of them ornamented their woolly hair with tufts of feathers, and wore cords wound several times tight round their bodies, intended, as the French conjectured, to support the muscles of the belly. The faces of many were smeared over with charcoal, and they had a bone through the septum of the nose. They seemed extremely fond of perfumes, and most of the articles procured from them were scented. These savages displayed great dexterity in steering their canoes, and could sail swiftly round the vessels. They were very earnest that the French should go on shore, where their houses stood on posts, five or six feet from the ground, like those of the Papuans.

Further discoveries were made in Australasia by M. de Bougainville. A few degrees north of Louisiade he found a number of islands which bear his name, as also straits to the north-west of Solomon's islands. One which appeared to have a good harbour, he called *Choiseul island,* and sent out boats to examine it. But while his people were engaged in sounding, the natives, who had previously shewn a hostile disposition, suddenly attacked them with ten canoes. They were armed with bows, spears, and shields; the latter consisting of plaited rushes, and so thickly interwoven as to be impenetrable by arrows. These savages advanced in good order, and dividing their force, attempted to surround the boats, and even after receiving the fire of musketry, continued to throw lances and discharge their arrows; facts which at once proved their intrepidity, and their familiarity with war. Their bravery, however, was unavailing, and two of their canoes, containing ample store of arms, were taken by the French. The natives were black, with curled hair, dyed white, yellow, and red. Those of another island went entirely naked; the short woolly hair of many was also stained red; and white spots were painted on different parts of the body. M. de Bougainville next made the coast of New Ireland, and anchored in a bay, formerly named Gower harbour, by Captain Carteret, and now called *Praslin's Bay.* Having afterwards traversed the north coast of New Guinea, he directed his voyage homewards.

Nearly about the same period, M. de Surville, also a Frenchman, undertook a voyage to Australasia on some commercial speculation, with the special nature of which we are unacquainted. He commanded a vessel of considerable size and force, and sailed from Pondicherry with a cargo in June 1769. On the 6th of October, being in 6° 56′ south latitude, and longitude 151° 30′ east of Paris, he saw an island which he named *First Sight island,* and then came in view of land with a great chain of mountains extending as far as the eye could reach. The latitude of the island was fixed at 7° 15′, and its longitude 155° east of Paris. Four islets and a high mountain seemed to form the mouth of a capacious bay, which Surville determined to explore. It proved to be uninhabited, but it abounded in fruit trees, and numerous birds of beautiful plumage. Fifteen leagues south of *First Sight island* high mountains were seen, and Surville proceeding along, passed many islands, which he was deterred from approaching by the state of the shores. At length he anchored in a fine harbour with reefs and islands at the entrance, which he named *Port Praslin.* Various interviews took place with the natives, whose early display of hostile intentions was averted by the conciliatory conduct of the French. Nevertheless, it quickly appeared how little they merited confidence, from leading their visitors into an ambuscade, where an encounter ensued, and thirty or forty of their own number were killed. Several of the French were wounded, and afterwards died. The ferocious disposition of the natives prevented M. de Surville from obtaining an intimate knowledge of the country, which was extremely inviting. He observed among the plants wild coffee, the cabbage tree, different species of almonds, cocoa nuts, and other fruits in abundance: the shores were likewise well stored with fish, turtles, and their eggs: and though no quadrupeds was seen, the wild boar was said to inhabit the woods. The people were of ordinary stature, strong and masculine; some were perfectly black, with soft woolly hair, others copper-coloured, with lank hair, and [illegible] of ferocious aspects. Most of them powdered the hair and eye-brows with lime, and painted a white line over the eye-brows. They carried clubs, bows, arrows, and spears, and as a defence had shields [illegible] wicker work, ornamented with tufts, or tassels, red or yellow straw. Their canoes were skilfully made by the union of several pieces, the joining of which were secured by mastic. M. de Surville, by a stratagem, captured a young savage, who testified a good and tractable disposition, and became much esteemed in the vessel. He was carried to Lima, but whether or not to France, we are ignorant. From him much interesting information was obtained respecting the manners and products of his country. It was governed by a chief, who enjoyed unbounded authority, and the respect shown to him was said to be so great, that the simple treading on his shadow was punished with death. M. de Surville was now amidst an archipelago of islands, in which he judged there were good harbours and fertile grounds. He discovered a detached island in 9° 46′ S. Lat. and 4° 20′ E. of Port Praslin, which, from the calms and adverse winds he experienced, he called *Isle des Contrarietés*. Canoes from it surrounded his vessel, but the natives were uncommonly shy: they were quite naked, and seemed of different races; some with remarkably large heads, resembled African negroes. Their apprehensions were quickly dispelled, and the chief came on board; his canoe was of workmanship singularly neat, inlaid with different coloured wood and pieces of mother of pearl. On comparing the result of M. de Surville's observations, it has been concluded that he was navigating among the Solomon islands; and it has justly been regretted, that he was prevented by untoward circumstances from completing their survey. The whole countries which he discovered were named by him the lands of the Arsacides; and to warn future navigators of their treacherous inhabitants, he left inscriptions in Port Praslin. After losing half his crew by disease, M. de Surville was unfortunately drowned when going ashore at Lima.

M. Marion du Fresne was employed by the French government to conduct a native of Otaheite to the Isle of France, and also to proceed on a voyage of discovery. But the Otaheitan, who had been brought to Europe by M. de Bougainville, having died at the island of Bourbon, M. Marion altered the course of the two ships under his command, the *Mascarin* and *Castries*, and in February 1772, found himself within the region of Australasia. He spent six days in Frederic Henry's Bay, Van Diemen's Land, searching in vain for fresh water, and then made the bay of islands in New Zealand in the subsequent May. There he exerted himself to conciliate the good will of the natives, and apparently succeeded; but after living thirty-three days on the most friendly terms, they, without any evident cause, found means to surprise two boats, and cruelly massacre 27 persons, among whom was M. Marion himself. The place where this happened, the French called Traitor's Bay. They took the full measure of vengeance on the natives, and then, instead of prosecuting the voyage of discovery, sailed for the islands of Rotterdam and Guam.

Cook.

It had now become of sufficient importance among some of the European nations to prepare expeditions for the purpose of geographical discovery, under the patronage of their respective governments. Of this kind was that under the command of M. de Bougainville; and those from Britain under Byron, Wallis, Carteret, and Cook. Such expeditions were less liable to failure from the precautions taken in fitting them out, and the strict observance of subordination; for several of the former navigators whom we have named, were obliged to desist from further enterprise, owing to the murmurs of their crew. The voyages of Captain Cook are too well known, and too easily accessible, to require any notice in illustrating the progress of discovery in Australasia. It is only incumbent on us to observe, that, independent of the new regions which he himself explored, he cleared up the doubts of preceding navigators concerning different Australasian countries, and accurately fixed their position on the globe. In his first voyage, he visited the coast of New Holland, and gave names to numerous islands, bays, and capes. In his second, he came in sight of Aurora island in July 1774, which he found lay in 168° 30′ E. longitude, and then saw Lepers isle, which appeared to be cultivated; but none of the inhabitants would come on board. He then landed at Mallicolo, the same which had been mentioned by Quiros, where the people put little or no value on European articles. They exhibited singular proofs of honesty; but they seemed to distrust their visitors, until they saw preparations for departure. They were a deformed race, with long heads, flat faces, and monkey countenances; and they wore cords tied so tight about the belly, that Captain Cook compares their appearance to that of an overgrown pismire. Landing at another island, Erromango, 2° south of Mallicolo, he was treacherously attacked by the natives; but a friendly intercourse was established with the isle of Tanna, the inhabitants of which supplied him with provisions. Most of them had good features and agreeable countenances. Apparently, the women performed the most laborious occupations; they wore a petticoat down to the knee, necklaces, ear-rings, and amulets. Here were seen a volcano and hot springs. In August of this year, 1774, Captain Cook anchored in a great bay of the *Tierra del Espiritu Santo*, sixty miles in extent of coast. He effected an accurate survey of the whole island, which he found twenty-two leagues long, twelve broad, and sixty in circuit. The island of Mallicolo he found eighteen leagues long and eight broad, fertile, and well inhabited. Of the chain of islands which he here visited, the *Pic de l'Etoile* is the most northern, and the island of *Annatom* the most southern. The whole lie between the latitude of 14° 29′ and 20° 4′ south; between 166° 41′, and 170° 21′ of east longitude, and extend 125 leagues from north north-west to south south-east. He called these islands the New Hebrides; thus changing their name a third time. Leaving the Tierra Austral, he next discovered an extensive country of Australasia, apparently about eighty-seven leagues in length, and about ten in breadth, which he called New Caledonia. The people were courteous and friendly, and, unlike any other nation in the South Sea, they were not the least addicted to pilfering. Their houses were in general circular, somewhat resembling a bee-hive, and fully as close and warm: the entrance was by a small door, or long square hole, just large enough to admit a man bent double. Some of the houses had two floors, one above the other, and most of them two fire-places. Captain Cook, after discovering the Isle of Pines, Botany Isle, and several inconsiderable objects, left the coast, and made sail for New Zealand. In the way thither, he discovered Norfolk island, which has since acquired greater consideration, though its whole extent does not exceed 11,000 acres; but this is amply compensated by its fertility. It was then uninhabited, and Captain Cook concluded that no human being had previously been there. At the time when we make these remarks, it supports a numerous population, though not of Australasians, and is chiefly in a high state of cultivation. Having made a short stay at New Zealand, Captain Cook left Australasia.

During his third voyage round the world, he also visited the same regions in the year 1777. Some of the inhabitants realised the fables of old, by sheltering themselves in the trunks of large trees excavated by fire, while the exterior was sound, and vegetation continued. Such were their sole habitations. He anchored a considerable time in Adventure Bay in Van Diemen's Land, and then made the coast of New Zealand, where he obtained numerous interesting illustrations of the nature of the country, and the manners and disposition of its inhabitants. Australasia was less the object of this voyage than the north-west coast of America, for which he departed in the end of February.

Forrest.

While new countries were sought for with such avidity in the southern latitudes of Australasia, some of the northern ones were also explored. Captain Forrest, an intelligent navigator, undertook a voyage from India, the leading design of which was to ascertain the practicability of forming a settlement on an island near the northern promontory of Borneo. This voyage was performed in a vessel of only ten tons, between the years 1774 and 1776. Captain Forrest examined the north coast of Waygiou, extending fifteen leagues, the extremity of which is immediately under the line, and he anchored in Offak harbour in 10′ N. latitude, and 127° 44′ E. longitude. After visiting several small islands, the inhabitants of which are so well provided with natural productions as to neglect the cultivation of the earth, he gained Dory harbour, on the north coast of Papua. When he lay off the mouth of it, the natives came on board, having their hair, which was sometimes ornamented with feathers, extended to such an uncommon size, that the largest circumference of it measured about three feet, and the least about two and a half. The hair of the women was disposed after a similar fashion, though not expanded to such a degree; and only the left ear was pierced, in which were suspended small rings. Their great houses were built on posts, several yards within low water mark, and capacious enough to contain many families under the same roof. The men and women wore little clothing, and the boys and girls went entirely naked. The people of Papua and the neighbouring islands are accustomed to war, and they have been known to collect such a considerable force as to alarm the Dutch for the safety of their colonial possessions. The natural history of

Sonnerat.

these islands has been illustrated by M. Sonnerat, who, nearly about this period, spent some years among them. Birds of paradise frequent them, and are regarded as valuable articles of traffic. M. Sonnerat obtained six different species, four of which he has engraved. In Valentyn's history of the East Indies, there is a long and minute account of these birds, copied by Captain Forrest, and, since his time, by other authors. M. Sonnerat represents the Papuans as brave and warlike, but cunning, cruel, and treacherous. Their aspect is hideous and terrific, and most of them disfigured by cutaneous disorders. With the different countries which they inhabit, it may be observed, we are very little acquainted: They are nearly the most northern of Australasia.

Don Francis Anthony Maurelle, during a voyage in 1781, where expedition was principally in view, crossed the line towards the northern parts of New Guinea, and steered a south-east course through some portion of Australasia. He discovered an island, the north coast of which extended eleven leagues, apparently in about 150° of longitude east of Paris, and between 2° and 3° of south latitude. The natives resembled the negroes of Guinea, in colour, hair, lips, and eyes. They seemed to be in great want of subsistence, and to draw their supplies chiefly from the sea. Their only arms were bows and arrows, the latter pointed with clumsy pieces of flint. This island was called Maurelle by Don Joseph Basco, and two of six others, discovered on the same day, he called St Michael and Jesus Maria. He fixed the position of Mathias island at 144° 54′ east of Paris, and steering through different clusters of islands on the north of New Ireland, he appears to have approached the Arsacides, and advanced towards Candlemas Shoals. But the particulars of his voyage are so indistinctly narrated, that we cannot positively ascertain either the discoveries which he made, or the countries which he visited.

In the years 1786 and 1787, La Perouse navigated some portion of Australasia. The only accounts we have of his voyage were transmitted by means of M. Lesseps from Botany Bay.

In July 1788, three ships, commanded by Lieutenant Shortland, sailed from Botany Bay for England. Owing to the advanced state of the season, he resolved, instead of steering a southern course, to go to the northward, and either pass through Endeavour Straits to the north of New Holland, or go round the east coast of New Guinea. Not long after leaving the settlement, he fell in with an island called *Simboo* by its natives. They invited him on shore, shewing him different kinds of provisions as an incitement; but the length of the voyage precluded his compliance with their solicitations. Standing on his course, he discovered other islands, and entered a strait; and supposing himself the first navigator who had penetrated it, he called it Shortland's Straits. It is unnecessary for us to examine the further progress of his voyage; for M. Fleurieu, in a learned critical discussion on the subject, has proved, that Simboo is the same as Choiseul island; the straits, those before called Bougainville's Straits; and the other islands, part of the lands of the Arsacides. Thus, whatever geographical illustrations may arise from Lieutenant Shortland's observations, they cannot be ranked among the discoveries of modern navigators. Nor should this occasion our regret, because, in claiming the credit of priority to his countrymen, M. Fleurieu has rendered essential services to the geography of Australasia.

In the year 1791, Captain Vancouver explored 110 leagues of the south-west coast of New Holland; where he discovered King George's Sound, and some clusters of small islands. The former lies in latitude 35° 5′ S. and in 118° 17′ E. longitude. Mr Broughton, who commanded another vessel on the same expedition, discovered a fertile and delightful island, situated in S. latitude 43° 49′, and 183° 25′ E. longitude, which he called Chatham Island. The hostility of the natives, who were of a brown colour, middling size, and stoutly made, prevented more minute investigation.

A late voyage by the French in search of their unfortunate countryman La Perouse, has also thrown much light on those distant regions. Two vessels, the *Recherche* and *Esperance*, sailed from France in September 1791, fully stored with all that was most likely to ensure the safety and success of the undertaking. In April 1792, they came within the limits of Australasia, and were some time occupied in observations on Van Diemen's Land, when they thought the south cape was separated from the main land: they also discovered a great harbour which they called Port D'Entrecasteaux. They next saw the Isle of Pines, which had received its name from high rocky elevations resembling trees at a distance, and laid down its position in 22° 42′ S. latitude. They then ran along an immense chain of reefs extending 324 miles on the coast of New Caledonia, which, in the view of the French navigators, presented a more inviting aspect than the original country of that name. Their attention was directed to the south-west coast, Captain Cook having surveyed the land only to the north; and, in the course of their examination, they saw many mountainous islands, and detached rocks, with their points above water, encircled by dangerous reefs. The difference was no more than 4′ between the position of New Caledonia as fixed by Cook and themselves. In July 1792, they saw the lands of the Arsacides, and ascertained the Treasury Islands to be five or six in number, or more, though when seen from a distance, they may be mistaken for only one. They lie in 7° 25′ S. latitude. The natives of Bouka Island trafficked for articles on board, parting with their arms for handkerchiefs and pieces of cloth. They were of a gay and lively disposition, and the French remarked, that they pronounced several Spanish and English words. The possibility of some intercourse with Europeans was thence inferred, and they shewed themselves acquainted with the use of iron. The French landed on Cocos island, and Laig, near the coast of New Ireland; in the former they found a tree nearly a hundred feet high, though but three inches in diameter; and so hard as at first to resist the heaviest blows of an axe. What is still more singular, when the pith occupying its centre was taken out, the thickness of the wood did not exceed four-tenths of an inch. The French then anchored in Carteret harbour, in New Ireland, which is surrounded by lofty and precipitous mountains, containing marine substances up to the very summit. This harbour forms a kind of basin, where clouds coming from the mountains are arrested by a calm, and there deposit their contents; which is the real source of the rains experienced by navigators. Sailing thence to the Admiralty islands, the situation of several places was determined in the way. A friendly intercourse was opened with the natives, who shewed a great desire to possess European articles. One island being cultivated to the highest part, and pieces being inclosed with fences, they were led to believe that the natives were acquainted with the right of property in land. A mountainous island occupied the centre of the whole groupe, and the same was the case with the Hermit isles, thirteen in number, which were next visited. The inhabitants of these and other islands manifested excellent dispositions: their chiefs punished dishonesty towards their visitors, and they approached the vessels unprovided with arms. Nearly under the line a number of other islands were discovered, all connected by chains of reefs, low, and covered by lofty trees, growing quickly and vigorously. After navigating among them, the vessels sailed to the Papuan islands, the situation of several of which was determined. In the subsequent year, 1793, the French made Lewin's land on the coast of New Holland, where they found that the latitudes had been ascertained with remarkable precision by its first discoverers. Many small islands were seen, which had not been previously visited; and having traversed several degrees on the south-west, they anchored in Port D'Entrecasteaux, as they had done in the preceding year. The accurate and interesting remarks then made on the natural history of the country, and disposition of the inhabitants, will be found at large in the works which contain them. The French next sailed for New Zealand, and fixed the latitude of the *Three King's Islands* at 34° 20′ south; they were particularly desirous of obtaining the New Zealand flax, from supposing that it would succeed in Europe, but they did not put their design in execution. An island discovered in 29° 20′ S. latitude, near the coast, of a triangular figure, was called *Recherche*. Precipices were seen in the interior, and trees growing on the summit of the highest places. It is one of the most eastern islands of Australasia. Some time afterwards the French got sight of Erronan, the most eastern of the New Hebrides, and made the island of Tanna, where they enjoyed a brilliant spectacle arising from the vivid flames emitted during the night by the volcano. Having made new Caledonia, their observations were resumed, and circumstances led them to conclude, that this coast had been fatal to their countrymen. Besides the natives, they saw here several savages of other parts, acquainted with the use of iron, and much more intelligent, whom they conjectured to have come from the island of Beauprè, discovered during their voyage hither in 20° 14′ S. latitude. From New Caledonia the French repaired to the Arsacides, and then passing Louisiade, as already mentioned, steered for the coast of New Britain, where they discovered several mountainous islands before unknown. The navigation of the western coast was replete with danger. Keeping to the north, they anchored at the island of Waygiou, called by the natives Ouarido, which is covered with large trees, and mountainous throughout. The natives went nearly naked: the chiefs only being clothed in stuffs obtained from the Chinese, and some had silver bracelets. From the great value set on iron, it was suspected that they were acquainted with some method of forging it; but the European commodity which they chiefly coveted was red cloth. Their huts, which were built of bamboo, and covered with reeds, resembled those of the Papuans, in being supported several feet above the ground on posts. The French were visited by several chiefs, one of whom even ventured to sleep on board the Esperance: but whenever preparations were made for getting under way, he precipitately threw himself into the sea. The Dutch had five months before treacherously seduced his brother into captivity, when he was invited to partake of an entertainment on board of their vessel. Although this voyage has not added much to geographical discovery in Australasia, it is valuable on account of its illustration of the natural history of the different countries, and the accuracy with which the astronomical observations seem to have been made. The two vessels lost nearly half their men, which affords a striking demonstration of the superior skill of British officers, who have been known to circumnavigate the globe, and hardly lose one of the crew. We are indebted to M. Labillardiere for an account of this voyage.

Wilson.

During the interval at which we are now arrived, between the expeditions of M. de la Perouse in 1786, and M. Labillardiere in 1794, the occasional voyages of the English between New Holland and Britain, or her eastern possessions, had been productive of some less important discoveries. In the course of the extraordinary, or rather the extravagant voyage performed by the ship Duff, a groupe of about eleven islands, lying in 9° 57′ of S. latitude, and 167° E. longitude, was discovered in 1797. The two largest were entirely covered with wood, and bore the appearance of great fertility. The natives were stout and well made, and of a copper colour. Their canoes were twelve or fourteen feet long, only fifteen inches wide, and made of a single tree sharpened at the ends.

Bass.

Flinders.

But we hasten to a voyage of greater importance, by Captain Flinders, which ascertained the fact of Van Diemen's Land being no part of New Holland. The merit of this discovery does not belong to him alone, for Mr Bass, surgeon of his majesty's ship Reliance, had previously made an excursion in an open boat to the southward of Port Jackson, towards the end of the year 1797. He sailed as far as 40° of south latitude, and visited every opening in the coast during his voyage. Between 39° and 40° of south latitude, he thought he had sufficient reason to believe that there was an extensive strait, or rather an open sea: and conjectured that Van Diemen's Land consisted of a groupe of islands south of New Holland. The want of a better vessel prevented him at that time from completing their circumnavigation. However, this was soon remedied by the governor of the English colony sending out Captain Flinders, suitably provided, on a voyage of discovery, accompanied by Mr Bass. They sailed for Van Diemen's Land in October 1798, and visited Furneaux's islands, discovered in 1774 by the captain of the Adventure. Preservation Island, which had received that name from proving an asylum to a shipwrecked crew, on being particularly examined, exhibited a singular kind of petrifaction that had taken place in the stumps of the trees. It extended far above the ground, but did not penetrate more than two or three inches downwards into a sandy soil. On standing further into the supposed strait, they discovered a large harbour, which they called Port Dalrymple, in S. latitude 41°, on the north of Van Diemen's Land. Though they were able to make interesting remarks on the animals, vegetables, and minerals, the shyness of the inhabitants prevented any intercourse or communication with them. To judge by appearances, they seemed even in a greater state of barbarity than the natives of the neighbouring continent, and to be quite unacquainted with navigation in the rude canoes constructed by the most savage of the Australasians. One island, fifteen or twenty miles in circuit, was next discovered, and another in latitude 40° 24′, E. longitude 145° 2′, which, from the innumerable quantities of albatrosses frequenting it, they called Albatross island. The wings of these birds expanded between seven and nine feet. Other ten islands were discovered in the vicinity, and the whole received the general name of Hunter's isles. In this latitude the navigators concluded that they had passed through a strait between one and two degrees in width, which separated New Holland from Van Diemen's Land. The appearance of the coast changed; a great swell rolled in, and a surf breaking on a bold shore announced the vicinity of the open ocean. On the 8th of January they passed the south-west cape of Van Diemen's Land; and what had hitherto been universally described as part of New Holland, proved a large island, completely separated from the continent. After being out twelve weeks, they arrived at Port Jackson. The discovery of this passage, named by the governor Bass's Straits, promised great advantages. In voyages from New Holland to the Cape of Good Hope, it was judged that a whole week would be gained, and some mariners affirmed, that no other course would ever afterwards be taken. In the year 1804, the China fleet entered the strait on the 28th of October, passed it in safety, and reached the coast of China on the 28th of December. The real value of such a discovery will be best appreciated by the importance attached to it by our countrymen in the remote settlements of Australasia. There, we are told by recent French navigators, that the remains of the vessel which made the discovery are preserved with a kind of religious veneration; and that parts of the keel, made into various little articles, are presented to foreign officers as donations, which no pecuniary recompence can obtain.

Captain Flinders was soon afterwards engaged in subsequent voyages of discovery. In the earlier part of the year 1802, he surveyed King George's sound, and the west coast of New Holland, from Lewin's land to Western Port. He again left Port Jackson in July of the same year, and sailing through Torres or Endeavour straits in thirty-six hours, arrived in the gulf of Carpentaria in the latter end of the season. The sickness of his crew obliged him to interrupt

Some young ones were taken, but all of them died except one, which lived until the expedition reached Timor, when it perished by accident. The French, after anchoring in Dampier's bay, behind a peninsula, which had hitherto been supposed an island, saw King William's river. It issues from a sterile region; and, from its confined and dangerous entrance, they concluded that it was of much less importance than had been represented. Seven low, barren, sandy islands were then discovered, which the French called the Rivoli islands, to perpetuate one of their victories: and the north-west Cape of New Holland, from which projects an extensive reef, with a sea violently breaking on it, they named Cape Murat. At Cape Murat, De Witt's land commences, and extends to the north cape of this immense continent, thus comprehending a tract of 10° in latitude, and 15° in longitude. It is supposed to have been discovered by a Dutch navigator in the year 1616, 1623, or 1628. The French now discovered a great archipelago; the islands composing which, in general, appeared barren, and many of them encompassed by rocks and shoals. Incredible dangers here assailed them: the vessels were driven towards the breakers white with foam; while the calms which prevailed, interrupting their manœuvres, increased the difficulties of an intricate navigation. In the course of it, Dampier's observations concerning the fineness of the weather, and the singular serenity of the heavens, were verified. The air had never appeared so pure and so free of vapours and humidity. Few of these islands were of large size; some were basaltic, and seemingly of volcanic origin; others, sandy, white, and sterile, rose under a thousand different shapes, several of them resembling immense antique tombs. Names were bestowed on a great number, as Forbin, Commerson, Colbert, Buffon, Cassini, Bernouilli, La Place; and the whole were comprehended under the denomination of *Bonaparte's Archipelago.* Disease had already begun to make ravages in the vessels, which forced their commanders to leave the Australasian regions to recruit their strength at Timor. After residing some months at that island, they made D'Entrecasteaux's straits in 62 days on their return. The discovery of these straits they consider the most remarkable and important of any connected with Van Diemen's Land: whence they were judged deserving of the greater notice. Thirty-six days were occupied in observations, during which many acquisitions were made to natural history; and several geographical errors corrected. Tasman's isle proved only to be a peninsula; but they found D'Entrecasteaux's geographical labours so perfect, that nothing could exceed them. Departing thence, Maria's island, discovered by Schouten in 1642, was surveyed. It is situated in 42° 42′ of S. latitude; consists chiefly of two kinds of granite, and is covered in a great measure with marshes interspersed with rocks and sand. Opposite to Cape Peron is a solitary rock of granite 150 or 200 feet high: and a large portion of the island is surrounded by lofty walls of granite, of 300 or 400 feet in height, with vast caverns penetrating into their bases. The natives of the island colour their hair from a mine of a kind of oxide of iron: and go entirely naked, except in a kangaroo skin hanging over their shoulders. Among the terrestrial mammiferæ, only a single species of dasyura, the size of a mouse, was seen. Numerous troops of dolphins, cetacea, and phocæ, lined the shores; the last of which are of infinite consequence in the consideration of Maria's island. Other observations confirmed the accuracy of Tasman and Captain Flinders, and pointed out a remarkable number of isthmuses proceeding from the land. Schouten's islands were all, except one, found for the first time to be so many peninsulas connected by mountainous tracts to the main land. Few appearances more singular than this island are presented by the Australasian regions. It consists solely of lofty black mountains, divided by deep vallies; the eastern side is absolutely naked, without the smallest traces of verdure; and several parts of the summit rise into granitic points, resembling so many columns raised by the hands of men. The French next traversing the east coast of Van Diemen's Land, entered Bass's straits. There, after naming many islets, and recognising Furneaux's islands, they fixed the situation of Wilson's promontory at 39° 10′ 30″ S. latitude. Captain Grant had made it 39° 2′, and Captain Flinders 38° 57′; but the observations which carry it 17′ farther west, are probably nearest the truth. From Wilson's promontory on the south, to Cape Lewin on the west, is an extent of [illegible] leagues: the only part of which that had been surveyed previous to the arrival of the French, was from Cape Lewin to St Francis and St Peter's islands, on the eastern boundary of Nuytz' land. The English not having continued their investigation beyond Port Western, all the tract intervening between it and Nuytz' land was unknown. The French, in sailing 944 miles along the coast, from Wilson's promontory, found bays, reefs, shoals, and islands, before undiscovered. A great gulf, penetrating above 100 miles into the continent, was named *Josephine's Gulf*, and opposite to it an island 210 miles in circuit, *Decres' Island.* A vast gulf next appeared, the opening of which resembled the mouth of a large river. It penetrated above 200 miles into the land, and contained harbours and islands within its bounds. This was called *Bonaparte's Gulf.* The French then traversed a coast by them named Napoleon's land, and in the course of their run discovered 160 islands, all very low, and of a grey, yellow, whitish, or black colour. Nearly the whole were of the most repulsive aridity; their surface was encrusted with dingy lichens; few exhibited a tree or shrub; fresh water scarcely existed in any of them; and they were entirely uninhabited. It was further ascertained, that the expectations so long entertained of a river behind the isles of St Francis and St Peter, dividing New Holland to the gulf of Carpentaria, were delusive. Forty-three days were occupied in surveying Napoleon's land; and the French affirm that, in the course of their navigation from Wilson's promontory to Cape Farewell on the west, they saw above a thousand leagues of coast, including bays and islands, But their researches were baffled by a succession of tempests: rocks and shoals threatened them on every side, and frequently interrupted the progress of investigation. At length the failure of provisions and sickness among the crew, constrained them to think of seeking relief in some port of Australasia. In May 1802 they stood for Port Jackson, sailing round by the south of Van Diemen's Land, instead of passing Bass's straits. Fluted Cape, they remarked, consisted of lofty reddish basaltic columns, rising 500 feet above the level of the sea, and forming an enormous causeway, against which the waves broke furiously from the south. Such basaltic appearances, both there and in other Australasian islands, were considered the more singular, as no volcanic substances were recognised in their vicinity. In Adventure bay, the rude aspect of Fluted Cape suddenly changes; a calm instead of a tumultuous sea prevails; the shores are covered with beautiful trees and shrubs; and thick forests clothe the very summits of the mountains. Meantime the scurvy made the most deplorable ravages in the vessels, and on board the Geographer there were only four men who could keep the deck: On approaching the English settlements, their manœuvres betrayed the weakness of the crew, whence the governor sent out assistance to bring them into port. Here the French made a considerable stay: one vessel was sent home, and the other, accompanied by a small bark, resumed her voyage of discovery in 1803 and 1804. Detailed accounts of this voyage have not yet reached this country; but we have reason to expect that they will prove highly interesting to men of science.

Towards the end of the year 1805, Mr Savage visited the Bay of islands in New Zealand, situated in 35° 6′ S. latitude, and 174° 43′ E. longitude. From his narrative we may infer, that the inhabitants, of that part at least to which his observations were chiefly directed, are in a state of civilization far superior to those in many other portions of Australasia. The principal town consists of about an hundred huts, partly on an island, partly on the main land. Each habitation on the latter is surrounded by a small patch of cultivated ground; but those on the former are occupied by the chief and his people, and are without any appearance of cultivation.

The numerous voyages between our Australasian colonies, and the mother country or the eastern settlements, are occasionally productive of discoveries in their route. These, we must regret, are not preserved, and regularly communicated to the public, from which, we are satisfied, many geographical illustrations would ensue.

An infinity of unknown objects, well deserving the attention of naturalists, are produced in the seas and on the shores of Australasia. Three new quadrupeds, all singular, and some of them far removed from those of the old world, have been discovered; the kangaroo, the wombat, and the ornythorincus paradoxus. The first resembles a huge rat three or four feet high; it leaps on its hind legs, or supports itself solely on the root of its tail: the second is a creature of the utmost docility, which, in its wildest state, may be seized and carried away without struggle or resistance: and in the third, nature, by a strange association, has elongated the snout of a quadruped into the bill of a bird, furnished with two real and perfect mandibles. The wombat is already domesticated, and dwells in the English cottages as tame as a dog. Numerous beautiful birds are produced in Australasia: the bird of paradise, which was so long celebrated in Europe as wanting feet; parroquets, cockatoos, a singular species of cassowary inhabiting Decres' island and the continent; and above all, the black swan, a bird which, until discovered there, was deemed of fabulous existence. Whales of immense size, seals, and dolphins, line the shores, often appearing in such extensive shoals as to be mistaken for a reef covered with dangerous breakers. Many serpents of different species are seen floating on the surface of the sea, and an enormous cuttle-fish, rolling like a cask on the waves, stretches out its monstrous tentacula seven or eight feet in length. The mollusca tribe appears in peculiar variety and brilliance. New vegetables are found in every quarter. One marine fucus reaches from the bottom of the sea to the surface, 250 or 300 feet deep, on a single stem, which is supported in an admirable manner through its whole extent by vesicles filled with air. Detached by the violent agitation of storms, this gigantic weed floats in so great an abundance as almost to impede the navigator in advancing towards the neighbouring shores. On various islands, and also on the continent, are trees above 200 feet high, or much more according to some narratives, and seven or eight in diameter. Without entering more minutely into this part of our subject, a general idea of the novelties of Australasia may be formed, by learning that the French transmitted from Port-Jackson no less than 40,000 animals of all different classes. By their united labours, they have enriched the National Museum with above 2500 species absolutely new; and, what cannot fail to be deeply interesting to the contemplative philosopher, some animals have been found alive in these regions, which were previously known only in a fossil state.

Savages of Australasia.

Descending the different gradations of society, man is exhibited to us in his most savage state in Australasia. His physical constitution, the structure of his person in an enormous head and slender extremities, distinguish him from all other nations. His sight is more acute, and his hearing more perfect, but his strength is less than that of natives belonging to civilized countries. Regions so extensive and far removed are inhabited by various races of people, whose appearance, as well as manners and customs, differ according to their respective tribes. Population, however, from many reasons, is scanty; which well illustrates how much a kingdom is strengthened by civilization, and the ready means of subsistence. Savages rest their security principally on personal superiority; for the right of appeal from injury is rare. In Australasia, where supplies of food are precarious, the natives are sometimes forced to swallow large portions of a kind of soft earth to appease the cravings of hunger; and this is said to be of easy digestion. The affections of the Australasians are blunt when compared with those of the inhabitants of other countries. Parental love may be assimilated to the attachment of an animal for its young, and conjugal affection centers more in convenience than regard. Mothers not only procure abortions by violent means, but lamentable instances are told, and those too well authenticated, where, to be freed of the plaints of their infants, they bury them alive: a horrible expedient, and unexampled in any other part of the world. Yet their own sufferings must infallibly tend to lessen the poignancy of feeling. The rude and brutal men tyrannize over them; they are exposed to insult and indignity; and their condition is little better than that of slaves. The union of the sexes, though apparently matrimonial, is, in many cases, only a temporary association. The courtship of the men does not consist in smiles or solicitation, but in stealing behind the object of desire, felling her to the earth with a club, and carrying her off while in a state of insensibility. She is kept by the man as his wife so long as he finds it convenient: he then deserts her to form a new alliance, accompanied by equal violence. The Australasians are universally to be distrusted; they are cruel, treacherous, and commonly guided by the impulse of the moment. Nothing but the consciousness of inferiority awes them into submission; and they never lose sight of that instant when the vigilance of others may be lulled asleep. All are brave, suffer pain with fortitude, and among some tribes an injury is retaliated to the precise extent that it has been inflicted. Every sentiment of delicate reserve is unknown among these people: which amply proves that modesty is an acquired sentiment, and not implanted by the hand of nature. Investigations into the disposition of the Australasians has removed a doubt, which was only made such, because revolting to our feelings, that many tribes are cannibals. But this is now so fully ascertained, that it will never be again called in question: for the inhabitants of these regions are greedy of human flesh. Viewing the fact with a philosophic eye, perhaps it ought not to appear so strange that men can devour each other. We ought first to consider how low the Australasians rank in the chain of society: probably they are removed only one link from the brute creation. Many of their tribes are situated in bleak and barren districts: they are strangers to the art of cultivating the earth; few vegetables of natural growth are adopted for food; and animals are rarely within their reach. While prosecuting their frequent wars, they are exposed to additional privations, augmenting in proportion to the continuance of hostilities. But in devouring the bodies of their enemies, they not only gratify revenge, and possess an unequivocal token of superiority, but, by an easy means, the pressing calls of nature are satisfied. Neither ought a banquet of human flesh to appear incredible. Have we not known repeated calamitous occasions, some even of recent date, where, among our own countrymen, the survivors fed on their deceased companions merely to protract existence? nay, where the flesh of one, sacrificed to preserve the lives of others, was greedily devoured, and his warm blood drunk with pleasure.

Some tribes burn their dead.

All that we behold in Australasia, however, is not to be considered as entirely new; for there are, in the manners and customs of the natives, several conspicuous coincidences with those of the old world. In certain places they burn their dead. The origin of this custom is lost in the antiquity of those barbarous nations; but M. Peron, while speaking of the tombs which he found in Maria's island, endeavours to account for it thus. "Man is, in these regions, an absolute stranger to every principle of social organization; wanting chiefs, properly so denominated; without laws, naked, ignorant of agriculture, and deprived of the certain means of subsistence. His only arms and utensils are a rudely fashioned club and spear. Wandering with his family on the coast, where his ordinary exigencies are supplied, he remains longer, and returns more frequently to parts where shell fish abound, and where a stream of fresh water enhances the value of the situation. Does a respected old man die, leaving a numerous family, how shall they dispose of his body? They cannot abandon the corpse of a parent to beasts of prey; consequent putrescence could not fail to prove disgusting; and the scattered bones of what they knew once formed their parent, constantly presented to their sight, would excite a painful sentiment of self reproach. They are restrained from throwing the body into the sea, a natural and easy expedient, lest it might again be cast up on the shore; and perhaps its corrupted members might be mingled with what they sought for daily food; embalming it is beyond their ideas and resources; and inhumation is so much the more difficult, from the hard and rocky soil, and from their having no utensil wherewith to dig a grave. Yet such a measure would probably be resorted to, did not one occur which is more easily executed. This is *cremation*. Here every thing conspires to the facility of execution; fire and materials are ready at command; only a few hours are required to finish the work; and the fragments of bones, which are the sole residue, may be covered with the ashes produced. Thus the custom of burning the dead is not the pure effect of chance; it results from physical and local circumstances."

Although many Australasian regions are [illegible] and sterile, there are extensive portions which cannot be exceeded in fertility. The beauty of different islands, the salubrity of the climate, and excellence of the soil, held forth the conspicuous advantages which would ensue from rendering them a permanent abode. Hence it was that, centuries ago, the utility of colonizing Australasia occupied the attention of Europeans. Mendana, as we have seen, established himself in Santa Cruz, an island presenting the most valuable resources to the navigators of the neighbouring seas. His views, however, were not originally directed to that particular spot; for it was only in consequence of his search for the Arsacides failing, that he went thither in 1595. When the colony was abandoned, and, on Mendana's decease, the government devolved on his widow, she made another attempt to discover the Arsacides. The voyage was short and unsuccessful, and a sudden determination was adopted to sail for the Spanish settlements in South America. Quiros, who had been chief pilot to this expedition, renewed the design of a colony, after having a second time traversed the Australasian ocean. Whether or not he carried out people and materials for such a purpose, or what was the specific intention of his voyage, is uncertain; but he addressed a memoir on the subject to Philip III. of Spain, which was published in 1610, a few years after his return. He entertained a different opinion from Mendana, with regard to the most suitable place for a settlement, judging the Tierra Austral del Espiritu Santo, lying some degrees farther south, as the best. It is not surprising that he should have felt partiality towards a territory which he himself discovered. In enumerating its qualifications, he proceeds: "Finally, sire, I can, with confidence, assert, that the bay of Vera Cruz, situated in 15° 20′ south latitude, presents the greatest advantages for the foundation of a large city, and the establishment of a numerous colony. I can but imperfectly describe the riches awaiting those Europeans who shall visit such delightful countries; time, in unfolding them, will make amends for my inability; and I doubt not that this colony will become the centre of communication and future mart for all the commerce of Chili, Peru, Ternate, the Philippines, and other remote kingdoms under the dominion of your majesty." Quiros pledged himself for the success of any enterprise which should be devised for establishing a colony: and, as a more ready inducement, gave in detail a truly flattering picture of the soil, climate, beauty, and salubrity of that and other Australasian regions. We apprehend that no active measures were ever taken to adopt his judicious proposal.

The learned President de Brosses terminates his work on southern navigations with an ingenious and enlightened disquisition on the establishment of colonies. He shews the various ways in which they may prove useful to the mother country, either serving for the deportation of criminals, or for the ends of commerce. After treating at large of the different regions, their qualities, and defects, where settlements may be made, he decides in preference of Australasia. "Any colony established in New Britain, New Guinea, New Holland, or among the Papuans, will have the clue of Ariadne at command. With time, perseverance, and some expense, which cannot be regretted, as it will return an hundred fold, all will be successively attained. This, it is true, will not be the work of a day. Great projects presume the necessity of great exertions, and these long continued. The calculation of time by years belongs to individuals, a whole nation counts only by ages. Powerful kingdoms being adapted for extensive views, their kings, animated by the love of glory, attachment to their country, and benevolence towards mankind, ought to consider their people as always in existence, and labour for an infinite protraction of time." M. de Brosses, after reviewing the state of all the countries then known, seems to think that New Guinea is the most favourable site for an Australasian colony. He enters into considerable detail concerning the persons, utensils, and materials requisite for founding an establishment, and the advantages which might be expected to result from it. The mode to be pursued in carrying on an intercourse with the natives next engages his attention: he suggests what difficulties will be opposed by them, and recommends the utmost moderation in all the dealings of the settlers. In a work, *Terra Australis Cognita*, published ten years afterwards at Edinburgh by a Scotish advocate, the same ideas are farther insisted on: but this work being founded entirely on the former one, and possessing few claims to originality, merits no farther consideration.

We are not aware, that, from the days of De Brosses, the colonization of Australasia occupied the notice of Europeans, until necessity compelled the British government to look for some distant establishment. It had been the practice of Great Britain, during many years, to transport felons to the American plantations; but the revolt, which ended in their separation from the mother country, rendered it necessary to provide another place for a similar purpose. Most of the southern navigators had approached the coast of New Holland where it is bleak and barren, whence disadvantageous conclusions had followed concerning its nature. The discoveries of Captain Cook, however, shewed, that the eastern parts were rich in vegetable productions, that the soil was good, and the climate agreeable. Government, after having sought in vain for a suitable place on the coast of Africa to receive transported criminals, determined, in 1785 and 1786, that part of Australasia should be chosen as a settlement. In the subsequent year, several vessels laden with convicts, and also carrying out the members of a civil government, sailed for Botany Bay. They reached it in safety; and having founded a town in the vicinity, began to cultivate the country. It would exceed our design of exhibiting a brief sketch of the progress of discovery, and general views of Australasia, to follow the advancement of that colony. Thousands of British subjects compose it, and branches on a lesser scale have been established elsewhere. A settlement originally intended for the cultivation of the flax plant, has been made on Norfolk island. More recently it was proposed to establish another at Port Philip, in Bass's Straits. The harbour there was said to be excellent, and the qualities of the neighbouring country were supposed peculiarly well adapted for it. Two ships of war and a merchantman, therefore, sailed from England in 1803, carrying out what was necessary for accomplishing this object. The civil and military departments, settlers, and convicts, were all landed on the coast, where, to judge by simple appearances, every thing promised fruitfulness and plenty. On narrower inspection, however, none of the soil nearest the shore was fit for producing esculent vegetables; and what at first sight were thought pools of fresh water, proved only drains from swamps, stagnant and deeply impregnated with the decaying remains of plants. Port Philip was on the whole considered an unsuitable situation, and the colony soon removed to Derwent river.

Doubts have lately been started concerning the expediency of retaining our present colonies in Australasia. Whatever may be their real advantage to Britain, neighbouring nations have unquestionably beheld them with surprise and admiration. Assuredly it may excite admiration, that countries altogether uninhabited, or occupied within these very few years by the rudest of all known savages, overgrown with woods, and intersected by marshes, should at this early period exhibit fertile plains covered with luxuriant harvests. That whole towns should be erected, and the communication of the different settlements be carried on through means of roads, now traversed by carriages framed in the British metropolis. That cattle, once unknown in the vast continent of New Holland, should at present run wild in greater numbers than are sufficient for the demands of a populous nation; and that sheep, equally unknown, should have seven years ago been possessed in flocks of 4000 by several of the settlers: a fact which has given rise to calculations and conjectures, that they will soon produce more wool than all Great Britain has occasion to consume. Safe and

Australasia. 1700-1810.

commodious harbours afford a convenient reception to vessels employed in the Australasian whale and seal fishery: and merchants have found a ready mart for their adventures in traffic from the Cape of Good Hope, or India. All this resulting in so short a time, and when opposed by obstacles unexampled in forming other establishments, ought more and more to increase our wonder that it has been attained. The French navigators express their lively astonishment at the maturity of our Australasian colonies. Let us cite the report of the Imperial Institute on the voyage of discovery submitted to their opinion. "Every where in the regions traversed by M. Peron he has found the rivals of his country. Every where have they formed the most interesting establishments, of which erroneous and imperfect ideas prevail in Europe"........... "No subject can be more curious or interesting, both to the soldier and statesman, than the colony of Botany Bay, so long despised in Europe. Never was there a more conspicuous example of the omnipotence of laws and institutions over the characters of individuals. To convert the most hardened villains, the most daring robbers, into honest and peaceable citizens, or industrious agriculturists. Then to operate the like revolution in the vilest prostitutes: to change them by infallible means to faithful wives and excellent mothers. Next to watch over the rising population; to preserve them by the most assiduous care from the contagion of their parents, and thus breed up a generation more virtuous than the race from which it sprung;—such is the impressive picture which the English colonies present." The justice of these observations we ought not to dispute; but whether the benefit derived from Australasia shall be permanent, can be unfolded by time alone.

See De Brosses *Navigations aux Terres Australes*. *Voyages de la Compagnie des Indes Orientales*, tom. v. vi. Dalrymple's *Voyages to the South Sea*. Callander, *Terra Australis Incognita*. Laborde *Histoire Abregée de la Mer du Sud*. Burney's *Voyages in the South Sea*. Fleurieu, *Discoveries of the French to the South-east of New Guinea*. Dampier's *Voyages*, vol ii. iii. Bougainville, *Voyage autour du Monde*. Wallis, Byron, and Carteret, *Voyages round the World*. Cook's first, second, and third *Voyage*. Crozet, *Nouveau Voyage de Marion et Duclesmeur*. Forrest's *Voyage to New Guinea and the Moluccas*. Sonnerat, *Voyage a la Nouvelle Guinée*, p. 153. 156. Maurelle, *Voyage from Manilla, in Perouse Voyages*, tom. i. Collins' *Account of Botany Bay*. Phillip's *Voyage to Botany Bay*. White's *Voyage to New South Wales*. Vancouver's *Voyage*, vol. i. Hunter's *Voyage to Botany Bay*. Labillardiere's *Voyage in search of La Perouse*. Flinders' *Voyage*. Grant's *Narrative of a Voyage of Discovery*. Missionary *Voyage to the Southern Pacific Ocean*, p. 296. Tuckey, *Voyage to Bass's Straits*. Turnbull's [illegible]*ages*, vol. i.—iii. Savage, *Account of New Z*[illegible]. Peron, *Voyage aux Terres Australes*. Horsb[illegible]. *Sailing Directions*, 1809, p. 85—97. (*c*)

AUSTRIA.

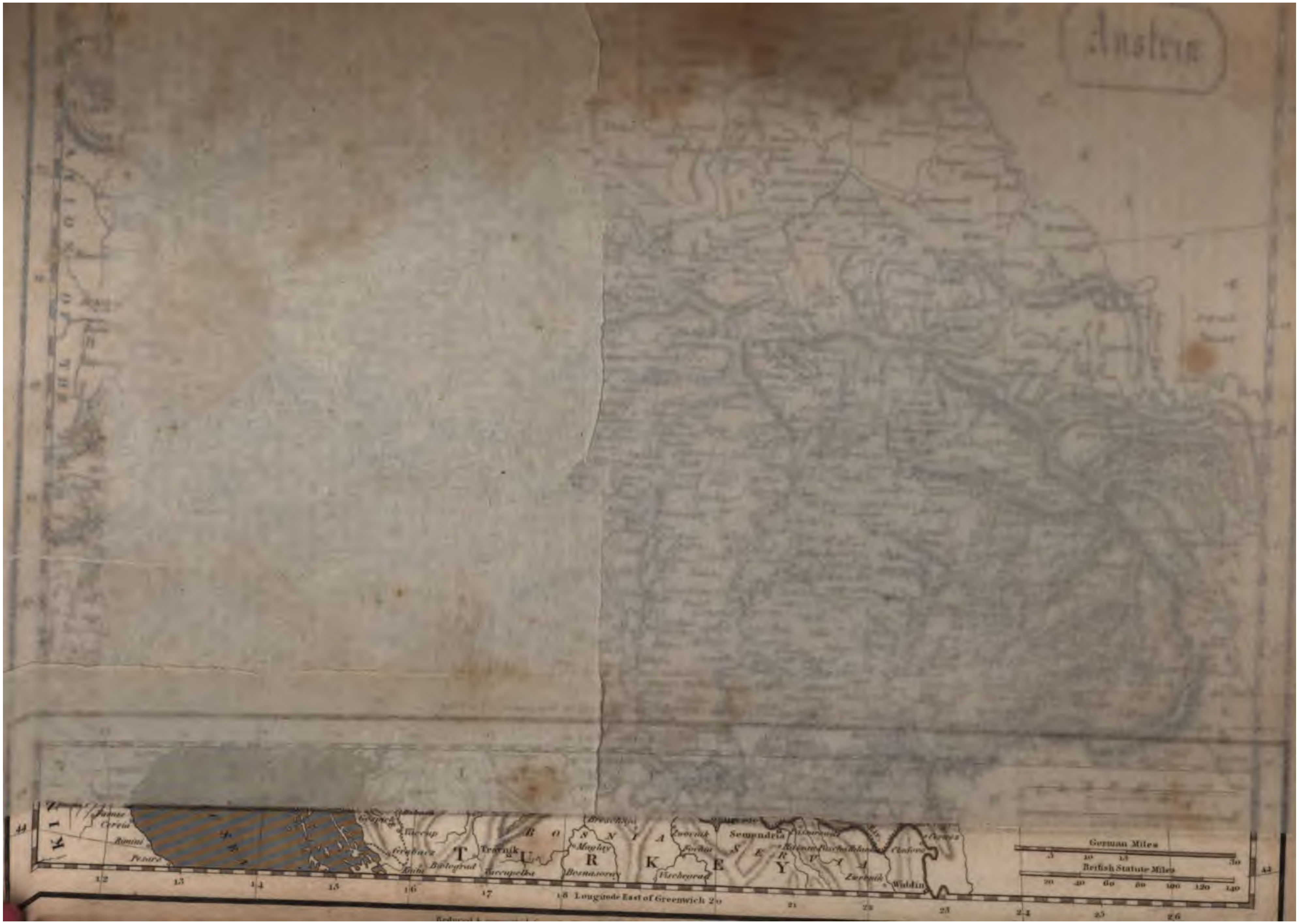
Austria.

Austria conquered by Charlemagne.

AUSTRIA, in German *Osterreich*, or *Ostreich*, is a considerable province of southern Germany, which has given fourteen emperors to that country, six kings to Spain, and has made a conspicuous figure in Europe for ten centuries. Of the early history of this fine region we are almost totally ignorant. Charlemagne conquered it in 791, after he had previously pushed the eastern boundary of his empire to the present frontiers of Bavaria and Austria; and, crossing the river Ens, which now divides Upper from Lower Austria on the south side of the Danube, he drove the eastern tribes, who were invading Germany, beyond the river Raab, in Hungary, and entrenched its banks as the limit of his western empire. He appointed governors, by the title of margraves, (or wardens of marches,) in the conquered country, and granted them various privileges, as protectors of the adjacent provinces against the barbarians of the East. It is probable, that the name of the principality, as well as its extent, varied during the period which elapsed from its establishment as a separate margraviate in 791, to the reign of the Emperor Otho III. who, in 996, gives it the present name in a written document still extant. The document in question, dated 1st November 996, refers to a grant of a village then called Nuiwanhova, now Waidhofen, made by the emperor to the church of Freisingen. "Nos Otho &c. quasdam nostri juris res in regione vulgari nomine *Ostirrichi*, in Marchâ et in Comitatu Hainrici comitis, filii Luitpaldi marchionis in loco Nuiwanhova dicto: id est cum eâdem carte et in proximo confinio adjacentes xxxx regales *hobas* concessimus." *Hund Metr. Salisb. cum notis Christ. Gerwoldi*. Ratisp. 1719, fol. tom. i. p. 94.

It is probable that Oster-reich (*eastern kingdom*, or *principality*) had for a considerable time been the vulgar name of the country, before the date of this grant, and that the vernacular language of the people was the same as it is now, since its first conquest and partial colonization by Charlemagne. Certain it is, that they have been nearly the same from 996 to the present times.

Austria continued a margraviate until 1156. During the 400 years which intervened between its establishment under that title and its exaltation to an archduchy by the Emperor Frederick I., in favour of his friend and relative Henry II. of Austria, Germany had been convulsed with wars, occasioned by claims to the succession to it. In 1156, however, the emperor just mentioned united Upper and Lower Austria (pretty much in their present extent in 1810) into one dukedom, and that too with such extensive privileges, that its bonds of dependence as a part of the fœderal Germanic body were almost totally dissolved. Henry and his successors ranked immediately *after* the electors, and *before* all the other princes and dukes of Germany. By the solemn act concluded at Ratisbon in 1156, the new dukedom was declared hereditary in Henry's family; failing of males, it was to descend to females; and, in the event


Austria
K I
Cervia
Rimini
Pesaro
Grabacz
Bielograd
Travnik
Zaccupelka
B O S N I A
Maglay
Bosnaserai
Zwornik
Fochia
Vischegrad
Semendria
S E R V I A
Zernik
Widdin
T U R K E Y
German Miles
5
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British Statute Miles
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of there being no direct heir of the ducal house, the actual possessor was to bequeath Austria to whom he pleased. These last mentioned privileges are very remarkable for that period of our European history.

ald.

Henry died in 1177, and was succeeded by his eldest son Leopold, who was the first *hereditary* duke of Austria. This prince was fortunate enough to receive from Othokar VI. duke of Stiria, that extensive province as a formal legacy. The important donation was confirmed to him by the Emperor Henry VI., who granted him the solemn investiture of that dukedom, at Worms in 1192. But Leopold proved very ungrateful to his superior for this act of kindness. Our *Richard Lion-Heart*, on his return from the Holy Land, was shipwrecked on the coast of Istria, and attempted to make his way through Germany to England in the dress of a pilgrim. He was discovered, however, at Vienna, and, by the order of Leopold, with whom he had quarrelled at St Jean d'Acre, ungenerously cast into a dungeon, and treated with extreme inhumanity. It was a considerable time before the mediation of the emperor, and a heavy ransom procured the liberty of the gallant Richard.*

lerick I.

pold II.

Leopold was, in 1194, succeeded by Frederick I., who went to Palestine, and obtained the sirname of *Catholic*. The younger brother, Leopold, the seventh margrave, but second duke, succeeded him, and was the first of the Austrian princes who adopted the wise policy of acquiring territory by purchase instead of chicanery or arms. He bought from the bishop of Freisingen some extensive estates and superiorities in Carniola, which, in 1809, remained in his family. He proved himself, in many respects, to be greatly superior to most princes of his age. Many of his successors availed themselves of the same means for gaining admission into provinces, which they intended gradually to secure altogether for themselves; and they were, perhaps, as much indebted for their astonishing success to their pacific policy, as to their military talents and their good fortune. It was not, however, until 1272, when Rudolf, count of Habsburg and Kyburg, and landgrave of Upper Alsatia, (founder of the houses of Austria and Lorraine,) was elected emperor, that Austria became a formidable power. That prince, the best politician, and one of the ablest men of his age, contrived to elude the jealousy of his rivals, and to consolidate the power of his heir, while he apparently studied the advantage of all the collateral branches of his house. In order to soothe the minds of the electors, always suspicious of their emperor's destination of their property and power, he granted to his two sons the investiture of Austria, Stiria, and Carinthia, *with their dependencies*; and to Mainard, their nearest heir, Carniola, and part of Tyrol; but with the restriction of a joint investiture with his sons, and a reversion in their favour. The count of Tyrol acknowledged them also as his superior lords. All these arrangements took place at a solemn diet at Augsburg, on the 27th of December 1282.

lf of
burg.

The sudden and great elevation of a simple count of the empire to the imperial dignity, and to the power of granting investitures so important to his family, without making enemies of the other great German princes, is a singular fact in the history of the times. Rudolf certainly was not elected to establish and extend the imperial authority, but, on the contrary, because his territories and his influence were so inconsiderable as to excite no fears or jealousies in the other princes of the empire, who were willing to preserve the *forms* of a constitution, the power and usefulness of which they had destroyed. Some of his successors were placed on the imperial throne from the same motive; but none knew so well as he did how to profit by the occasion thus offered, for extending and confirming the power of his family. The partition which he made of his territories among his sons and relations was entirely illusory, and calculated merely to lull asleep the suspicions of his neighbours. By the very acts of division and investiture, he reserved to himself the power of making what changes he might think fit in the testament by which he conveyed his estate to the members of his house; and actually declared his eldest son Albert sole proprietor of his Austrian provinces, a few months after he had secured the legal confirmation of the first grant by the diet.

It was the uncommon prudence, foresight, and caution with which he steadily followed out one grand leading object, without losing sight of it for a moment, that enabled Rudolf to accomplish the projects which he had formed for the grandeur of his family, and to lay so firmly the foundations of the Austrian monarchy. Among his other talents as a statesman, we may remark two, by which he obtained the greatest advantages; and the want of which, in his successors, has endangered or ruined their government: These are, a respect for established forms, and the opinions of his contemporaries; and a singular felicity in seizing the proper time for the execution of his purposes. He was often heard to say, "that violence *in form* was worse policy than violence *in act*;" and, "that for every human effort it could only once be said *Dies ist die zeit*," 'this is the proper moment.' He did every thing through the medium of the electors and great princes, whom he knew how to gain and to attach, according to the forms and regulations of the empire, and never once began any thing too soon or too late. How different from the conduct of his successors Joseph and Francis in our own days!

Frederick II.

Albert was declared king of the Romans in 1278; but this did not much contribute to his personal happiness, nor to his power as a sovereign. He was murdered by his own nephew John, (his brother Rudolf's son,) in 1308. His son Frederick, sirnamed the Handsome, succeeded him as archduke of Austria; and his other sons, Leopold, Albert, Henry, and Otho, enjoyed considerable fortunes in consequence of their father's will. Frederick aspired at the imperial crown, and was accordingly elected by a party, while Louis of Bavaria was set up in opposition by a very powerful body of the Germanic union.

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* The ruins of the castle of Thierstein, a few leagues above Vienna, where he passed many dismal hours, exhibited to us, in 1805, a sight worthy of the barbarism of its ancient master. Some French infantry took refuge among the ruins, after having been put to flight by a superior body of Russians. The latter paying no attention to the demand for quarter made by the French, murdered the greater part of them in the ruins, and cast the rest headlong from the ramparts into the Danube.

Battle of Muhldorf.

A bloody battle was fought at Muhldorf, in 1322, between Frederick and Louis. The latter gained the day, and took his rival and his brother Henry prisoners. He imprisoned Frederick in the castle of Transnitz, and entrusted Henry to the king of Bohemia, who powerfully befriended him on this momentous occasion.

Louis.

Louis was, however, soon after greatly embarrassed by the intrigues and hostility of Pope John XXII., who was determined, if possible, to pull him from his throne, and, with that view, wished a reconciliation with the Austrian princes. He therefore gave liberty to Frederick to return home to his states, but under the condition of renouncing the imperial dignity, both for himself and his family, during Louis's life, and also of procuring his four brothers agreement to that condition. Here a scene of honourable and disinterested generosity opens, which is uncommon among princes in every age, and of which few traces exist in the history of the world. Frederick's brothers could not be prevailed upon to agree to the renunciation promised to Louis. The spouse and children of the Austrian monarch supplicated him to remain at home, and to consider his engagement to his rival as cancelled by the cruel treatment which he had met with during his imprisonment, as well as by the consideration that his promise of returning was extorted from him by force, and consequently void in a moral as well as in a religious sense. His brothers joined in the same entreaties, and displayed sentiments of affection very inconsistent with the ambitious projects which prevented them from accepting the alternative of renouncing all claim, during the life of Louis, to the imperial dignity. Frederick, in spite of all their entreaties, returned to Munich, his enemy's capital; delivered himself up, on the day appointed, as his prisoner; and, to the astonishment of Europe, renounced his crown, his liberty, the endearments of a family whom he tenderly loved, and every prospect that could make life valuable, for the sacred pledge which he had given by his word. What a contrast to the conduct of the popes and princes of his age; and what a charming glimpse of moral light across the midnight darkness of the times!

Louis, deeply affected by the magnanimity of his rival, received him as his bosom friend. They swore perpetual friendship, and lived as brothers until the end of Frederick's life.

For the space of 150 years from this period, the house of Austria underwent various changes, too tedious to mention, sometimes very critical, but generally ending favourably, until, in 1496, all the provinces which had belonged to it, excepting the Swiss cantons, were united into one sovereignty, along with many other rich countries, in the person of Maximilian, emperor elect in Germany, and king of the Romans. This took place nearly 200 years after the Austrian provinces had been divided among the descendants of Rudolf of Habsburg.

Maximilian.

Maximilian married Mary, the only child of Charles the Bold, duke of Burgundy, and heiress of his valuable states in France, Flanders, and on the Rhine. By her he had a son and heir, Philip the Handsome, who espoused Joanna, daughter of Ferdinand, king of Arragon, and of Isabella, queen of Castile. This Philip was father of the celebrated Charles V., who succeeded, in 1516, to an aggregate of European power superior to that of any monarch since the the death of Charlemagne. Charles V. had a younger brother, Ferdinand, and a sister, Mary, who married Louis II., king of Hungary and Bohemia. Ferdinand espoused, in his turn, Anne, sister of his brother-in-law Louis; and thus, by a double marriage, the way was paved for the annexation of Hungary and Bohemia to the Austrian states. The marriages took place at Lintz, in Upper Austria, on the 27th of May 1521.

Louis, of Hungary and Bohemia, fell in the battle of Mohatsch, in 1527, and Ferdinand contrived to get himself crowned king of Hungary and of Bohemia towards the end of that year. He, and his successors, however, have not enjoyed those two kingdoms in tranquillity since their incorporation with the Austrian provinces. They carried on, for 150 years, until the peace of Carlowitz, almost constant wars with the Turks for them; and the frontiers of Hungary, towards Turkey, were not definitively fixed until our own times.

In 1522, Charles V. yielded up to his brother Ferdinand all the German provinces, excepting the Low Countries, which he inherited in right of his grandmother, Mary of Burgundy; and thus the Austrian line was divided into two branches, the German [illegible] the Spanish. His brother procured him to be [illegible]ed king of the Romans in 1530. Ferdinand d[illegible] 1564, after having added the kingdoms of Hungary and Bohemia, with Moravia, part of Silesia, and several other smaller principalities, to the Austrian empire.

The three sons of Ferdinand of Austria, viz. Maximilian, Ferdinand, and Charles, divided his dominions among them. The eldest was emperor of Germany, and archduke of Austria. The descendant of Charles, the youngest son of Ferdinand, also named Ferdinand II., reunited once more, in 1619, under his authority, almost all the provinces which were possessed by Ferdinand, his grandfather. This Ferdinand began the 30 years war against the Protestants, and carried it on during the remainder of his life. Under him served Tilly, Wallenstein, and other eminent captains, against Gustavus Adolphus and his heroic generals. He fixed it as a law in his family-succession, that all his territories should descend to one, by right of primogeniture, and soon thereafter died, in 1637.

Ferdinand III. succeeded his father, and put an end, in 1648, to the 30 years war, by the famous *Treaty of Westphalia*, which constituted, for a long time, the basis of the public law of Germany.

Leopold I. succeeded Ferdinand III. in 1657, and reigned as emperor and archduke of Austria for 48 years, till 1705.

Joseph I. ascended the throne of Germany as emperor and archduke, on the death of his father Leopold I., and, aided by our great countryman Marlborough, raised the house of Austria's power to its ancient pitch. He died in 1711, and was succeeded by his brother, who assumed the name of Charles VI.

The wars which Charles carried on in Germany, Italy, and Spain, against Louis XIV., and others, made his reign conspicuous, and immortalised the talents of his principal general, Prince Eugene of Savoy. This prince commanded also against the Turks, and compelled them to sue for the peace of Passarowitz, in 1718, the most splendid and honourable which Austria had ever made. Charles VI. expired, after a turbulent reign, on the 20th of October 1740, leaving his eldest daughter, the celebrated Maria Theresa, who was married to the young duke of Lorraine, heiress of all his possessions. In Charles was extinct the last of the family of Rudolf of Habsburg in the male line: With Maria Theresa's son, Joseph II., who was proclaimed king of the Romans in 1764, commenced the second royal house of the Austrian family, viz. the house of Lorraine. Maria Theresa, whose heroic conduct, and inconsistent and tumultuous political career, are well known, died on the 29th of November 1780, leaving her vast empire, and an army of 300,000 men, to her son Joseph, now mentioned.

Of all the princes of the house of Austria, none laboured with more sincere ardour to promote the welfare of the people than Joseph II., and yet of none was the reign so disastrous to his country. He was not always mistaken in the views which he took of the best interests of his subjects, nor perhaps in his conceptions of the means of improving their conditions; but his precipitancy and rashness ultimately defeated all his projects. He wished, at the same time, to ameliorate the internal government and administration of his vast empire, and also to extend its limits; to cultivate the lands which he possessed in superfluity, and to acquire new territories; to civilize the millions of savages under his sceptre, and yet to reduce other millions under it also; and to finish every thing before it was well begun. Forgetting the example of his wise and great predecessor Rudolf of Habsburg, as well as of his illustrious contemporary Frederick of Prussia, who never studied the value of any thing so much as that of *time*,* he either rushed prematurely upon enterprises which required much delicate caution to render them palatable to his people; or, on the other hand, neglected the application of means, which, if properly timed, might secure the complete accomplishment of his projects. He appeared, indeed, all his life not to know, that time is one of the greatest and most essential elements in human institutions; and that what may be prudent at one period, may even, among the same people, denote absolute madness at another. He pulled down churches, monasteries, and nunneries, in one part of his dominions; and overset all ancient investitures in another; while, in a third, he proved himself the determined and bitter enemy of all that savoured of innovation. In Bohemia and Hungary he favoured the Protestants, and disgusted his Catholic subjects; while in Flanders, where public opinion had made eminent advances in the career of complete civilization, refinement, and tolerance in matters of religion, he followed a very different course: thus contriving, by a singularly unfortunate species of political blundering, to alienate the affections of the great majority of his subjects, without conferring any essential benefit on the remaining part of them. To this we may add, his contempt for the feelings, or, as he called them, the prejudices of his subjects, and for what every wise prince will always treat with mildness, if not with respect, their ancient usages, customs, and superstitions. He certainly appeared in Austria a great deal too soon, and before that country was ripe for the schemes of improvement, which, in a more civilized nation, might perhaps have been practicable. Had that nation possessed a more intimate acquaintance with modern ideas, and with the literature which has been diffused over the greater part of northern Europe in our times, he would very probably have produced something among them like the French revolution. The French monarch did not prevent, or could not prevent, that tremendous explosion; but the Austrian would himself have accelerated and increased it. The acting causes of the French revolution were quite foreign to the government, and beyond its controul; in Austria, the sources of the impending change were in the government itself, and yet their results have been almost equally fatal, in the first instance, to the tranquillity and happiness of both nations. Joseph's innovations would have produced fire and fermentation in France, but they excited, at the moment, only a passive species of dislike and disgust in Austria, Hungary, and Flanders; which afterwards degenerated into a sort of apathy, and intellectual and moral palsy, when the hour of trial arrived. His wars, or quarrels, with Turkey, Prussia, Bavaria, and Flanders, accordingly terminated in a manner which gave no good presage of the state of his empire as a first rate power. He died on the 20th of February 1790, in the midst of preparations against Prussia and Turkey, which promised no better consequences than his former ill-concerted schemes. He left no children, and was succeeded by his brother, Leopold II., then grand duke of Tuscany.

Austria.

Leopold II.

Leopold II. had reigned as a wise man and a beneficent prince for 25 years in his interesting and happy province, when he was called to the throne of Germany and Austria. He made peace with Prussia and Turkey; was involved, probably against his inclination, in the tremendous revolutionary war, afterwards so ruinous to his house, and died on the 1st of January 1792. His son, Francis II., succeeded him, and still reigns over the provinces which are the subject of this article, as a mild, tolerant, and benevolent prince. Austria, properly so called, has lost very little of the extent which it possessed in 996, from the period in which it gave the title of margrave to its lord, until the peace of Vienna, lately concluded in October 1809. A brief summary, however, of the circumstances which have, since January 1792, conduced to bring Austria into her present situation, may not, perhaps, be ill timed in 1810.

Francis II.

When the revolutionary war broke out in 1791-2, and the continental powers bordering upon France began to be alarmed by the principles which it propagated, and the serious aspect which it assumed,

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* Frederick was wont to say, when accused of hurry or impatience, "He who gains time gains every thing."

[illegible] East, and had late- [illegible] Bukowina. The [illegible] in Poland had added five millions

[illegible] Poland. [illegible] powers, or at least the cabinets, of [illegible] were as little disposed [illegible] with any military operations [illegible] might carry on against revolutionary [illegible]

Such was the state of Austria [illegible] powers of Europe, and to the two [illegible] divided her own councils in 1792. [illegible] prevailed. Austria sent nearly [illegible] Low Countries. She ought to have [illegible] that number, and she might easily have [illegible] joined by a considerable Russian force. A strong Russian army entered the Austrian states, and made some stay in the neighbourhood of Vienna previously to its march under the celebrated Suwarrow to Italy. Bonaparte was in Egypt, wasting the flower of the French army. Discord and imbecility filled the Parisian councils. Austria once more raised all her standards, and the court party at Vienna looked forward for victory and triumph.

Second coalition against France.

The bravery of the combined armies of Austria and Russia, and the military talents of Suwarrow, obtained at first some successes for the new coalition; but they proved of little consequence in the course of the war. Russians, like English soldiers, may fight like lions, and indeed often exhibit rare degrees of intrepidity and valour on the day of battle, but they do not *carry on* war so well as the French, nor are they so well officered, and so well supplied with the numerous requisites for long field service as that ingenious and active people. The Emperor of Russia, impatient of the sacrifices which he was making in the west of Europe, while all his exertions were necessary on the Persian frontiers; disgusted with the miserable fate of the gallant army which he had sent to Holland, and which partook in the hardships and humiliations of their brave English allies under the British commander in chief, recalled all his forces from the contest. England was compelled to remove her troops from the continent as heretofore; but she galled her enemy in Egypt, and had lately inflicted a deep wound upon his navy and army by the brilliant victory of Nelson over Brueys at Aboukir, and by Sir Sidney Smith's repulse of Bonaparte at St Jean D'Acre.

In spite of the defection of Russia and England *in Europe*, in spite of deranged finances, an empty treasury, bad seasons, and aggravated calamities of various kinds; notwithstanding the very equivocal conduct of Prussia, which seemed to watch an opportunity for raising herself upon the ruins of Austria; and notwithstanding the disasters of Marengo, and the loss of all Italy; Austria struggled forward, under all the vices of her old corrupted and incompetent war administration, until the decisive battle of Hohenlinden, in December 1800.

Peace of Luneville, Feb. 9. 1801.

After the victory of Hohenlinden, the French general Moreau might certainly have advanced without much danger to Vienna, and dictated what terms he pleased to the Austrian monarch. But it was not the policy of France to ruin Austria, or to elevate Prussia or Russia into dangerous powers by her destruction. It was more prudent to keep her as a balance against both, until the season should arrive of degrading all the three successively, and in a way in which France alone would be the gainer, and would have to contend with only one of them at a time. The treaty of Luneville was accordingly concluded, and Austria lost only Venice, and a few trifling prerogatives in Swabia; while she got Salzburg and Berchtolsgaden as an indemnification for her sacrifices in Italy. The people of Vienna were highly pleased with these conditions; for they had expected to see the French armies in their streets, and they were glad at all events to procure any thing at that time like an honourable peace.

The Austrian armies were reduced to a lower pitch at the period of the peace of Luneville, than at any other since the year 1792, when the revolution war commenced. They perhaps exceeded 100,000 men, but the emperor could not bring 40,000 effective soldiers to bear upon any single point. To raise the military force to its usual level was therefore indispensibly requisite; and this seems to have been the main object of the cabinet in 1801, 1802, 1803, and 1804. Recruiting went on with considerable spirit, notwithstanding the loss of some important recruiting stations in Germany; and some few alterations, deemed judicious even by the enemies of the court, took place in the appointment of officers, and in the mode of paying the army. France did not look on with indifference. She always kept a vigilant eye towards the Austrian eagle, and was determined to pare his talons, or clip his wings, before he should once more soar to his ancient eminence. She therefore made one encroachment after another in Italy and Germany, and preferred so many demands, that Austria resolved for the third time to try her fortune against her great rival. England and Russia joined her with alacrity. The former gave money, promised troops, and probably meant to perform her promises in good time. The latter promised an army of 100,000 men, and actually sent 60,000 excellent troops on the day appointed, and forwarded the remainder with all possible speed. The king of Prussia was understood to be at least favourably disposed, if not actually pledged by his word and honour to join the coalition; and Sweden was to exert herself to the utmost in the same cause. Early in September 1805, the armies took the field. A court cabal sent the Archduke Charles and John, in whom the army had the greatest confidence, with secondary commands to Italy; while the post of honour, that of commanding the German army against the emperor of the French in person, was conferred upon General Mack. To complete the absurdity, this general's hands were tied up. He was ordered to advance far into Bavaria, and even to occupy the line of the Iller, 300 miles beyond the Austrian frontier, before a single Russian soldier had entered Germany. Mack's army did not exceed 80,000 men. Bonaparte was approaching with his wonted celerity, at the head of 180,000 combatants. The Bavarians and Wirtemberg troops joined him with all speed, and his army on the first week of October amounted to 220,000 effective men. General Mack sent dispatch after dispatch, and courier after courier, to Vienna, desiring permission either to retire upon the Russian armies, which were rapidly advancing, and had promised to be in Braunau on the 19th of October, or to file off towards Italy, and compel Bonaparte to meet him there by the way of Switzerland, or to risk being placed between him and the Russians, should the French venture to penetrate into the hereditary states. The unfortunate Mack, who is much more blamed than he deserves to be, was ordered to await the Russians on the Iller; and was favoured by the council at Vienna with the pleasing intelligence, that the French could not reach him before the end of October, and that in the mean time a landing, to be made by a powerful English army on the coast of

France or Holland, would relieve him from more than one half of their forces. While these puerilities passed, the terrible armies of France rushed like a torrent upon Swabia, Franconia, and Bavaria. Disregarding the neutrality of Prussia, they traversed Anspach, annihilated the army of General Mack at Ulm, and on the 15th of October, the third day after firing the first shot, decided the fate of this war, and ruined the third coalition, which had for its professed object the deliverance of Europe.

It was now in vain that the brave Archduke Charles defeated Massena with the French Italian army at Caldiero, and that the Emperor of Russia put himself at the head of his auxiliary force for the salvation of Austria. It was in vain that Nelson got the brilliant victory of Trafalgar. Prussia would not stir; and England, as on many other occasions, sent her gallant troops to fight against the storms of the north sea, and the winters of Germany, long after any thing they might atchieve could possibly avail herself or her allies. One disaster succeeded another. Bonaparte entered Vienna; passed the Danube on the same day, with infinite pleasure and composure, by the Tabor-bridge, which the Austrian commander Prince Auersperg had politely left free and entire for his accommodation; and in a very few weeks afterwards, discomfited and disgraced the Emperors of Austria and Russia at Austerlitz.

Of all the blunders committed by Austria since the commencement of the revolution war, fighting this battle, before the arrival of the Archduke Charles, was the most notorious. That gallant prince was at the head of a victorious army of 95,000 effective men, within six days march of the French, and was rapidly advancing to put Bonaparte between two fires, at the very time when the action, so fatal to Austria, was resolved upon. He accordingly entered Neustadt, took the military chest of the French army there, within 30 miles of Vienna, on the 10th of December. It was too late. The field of Austerlitz had produced, on the 2d of that month, an armistice, which, on the 4th, consummated the shame of Russia, and the degradation and political death of the Austrian monarch.

By the treaty of Presburg, which was signed six months after the commencement of hostilities, Austria lost, besides other provinces, her right arm of defence, Tyrol and the Swabian principalities. These might be considered as a vast fortress towards Italy, Germany, and France. They had been, for 300 years, constituent parts of the monarchy; and their population, brave, magnanimous, and warlike, had been for ages conspicuous for their attachment to the house of Austria. Their country had long been deemed impregnable, and, indeed, might justly be so reckoned, when backed by the resources of a powerful empire. Francis II. also lost Dalmatia, Istria, Frioul, and Cattaro; and, in short, cut himself off from every prospect of becoming the head of a maritime power in the Mediterranean.

In return for these sacrifices, and for heavy contributions paid in specie to the French armies, he received for his brother, the late elector of Salzburg, the bishopric of Wurtzburg, with its dependencies, and annexed Salzburg and Berchtolsgaden, which his brother had enjoyed since the treaty of Luneville, to the Austrian crown.

The treaty of Presburg was the most humiliating and disastrous to which Francis had hitherto been obliged to submit. It was talked of at Vienna in a style rather inconsistent with the apathy usually manifested on such matters by the public. Many persons spoke their minds freely against it; and the best friends of government seemed to be ashamed of the condition to which a powerful empire had so suddenly been reduced. The same feeling pervaded the court, and all the princes of the imperial family; especially the archdukes, who had shared in the campaign in Italy, and who attributed wholly to mismanagement the reverses which had produced this scandalous and disastrous peace. Meanwhile, however, the finances had gone into the most alarming disorder. The florin in paper had fallen, between the breaking out of the war and the signing of the peace, from 2s. sterling to 1s. 2d., and specie of every sort had totally disappeared. The armies were destitute of all supplies. Hungary had manifested symptoms, if not of disaffection, yet, at least, of lukewarmness towards the emperor, and had not exerted herself, during the war, in any degree proportionable to her resources. Officers in high situations had proved unworthy of their trust, and were to be tried. The arsenals of the empire were empty. Every necessary for carrying on the war was scarce, and extravagantly dear. Nothing could be expected from Prussia or Russia. Repose became indispensably necessary.

In 1806 and 1807, France occupied the period of Austrian palsy, occasioned by the war of 1805 and the treaty of Presburg, in destroying Prussia, and humbling Russia. It is foreign from our purpose to dwell upon the phrensy of those powers, who timed their exertions precisely in a way to accommodate their enemy, and to ruin their own resources. When Russia, in particular, which had on foot 435,000 men in her European states, chose to meet the French armies, upon her own frontier, with only 78,000 men, (as appears from her own statements of the battles of Pultusk and Eylau,) and when, after the enemy had spent many months inactive in her neighbourhood, she did not call forth above 40,000 men to recruit her wasted forces, and to enable her to drive him back from her dominions; Austria plainly saw, that there must have been some radical defect, some ruinous and irretrievable evil in the Russian councils, which would speedily lay that country, as well as Prussia, prostrate at the feet of France. Any exertions which she might make, were therefore considered as inexpedient and unavailing, and were accordingly withheld.

The summer of 1808 exhibited to Europe and the world a new scene in the modern revolutionary tragedy. France trampled upon Spain, and Spain struggled to resent the indignity, and make it recoil upon its authors. A nation, and not merely a cabinet as heretofore, appeared to start up with an astonishing degree of unanimity, and in language unknown for ages, to assert her rights, which had been perfidiously violated. Her enemy and oppressor poured his myriads of disciplined veterans into her territory; but although generally successful in the field, these afforded a proof, by the tardiness of their advances, and the precautions which they observed, that there is a vast difference betwixt carrying on war against the cabinet of a country, assisted by its military establishment alone, and waging it with the opinions, the patriotism, the living principle, hearts, and souls of its inhabitants.

During the period which elapsed from the surrender of the French fleet at Cadiz to the Spaniards, in June 1808, and of Dupont's army to the Spanish troops under Castanos in July, and the publication of Don Pedro Cevallos' statement of what had taken place at Bayonne between Bonaparte and the family of Spain, Austria was preparing herself for some further attempts to recover her lost provinces, or, at least, to escape from the further demands of France, which seem to have been incessantly galling and unwarrantable. The forces of France were now occupied in Spain in considerable numbers. Prussia, though prostrate, must have felt her degradation, and sighed for release and vengeance. Russia, it was thought, could not always remain in a state of unnatural and pernicious thraldom. Britain was making great exertions to annoy the enemy, and might perhaps, by experience, become expert in availing herself of her immense resources by sea and land. Germany was impatient under the French yoke, and so was Italy, Switzerland, and Holland. A fairer prospect never opened upon Austria for retrieving her recent losses, and recovering the military pre-eminence which she had long maintained.

Fourth coalition against France.

The fourth war with France, since 1792, therefore commenced. The Archduke Charles put himself at the head of the whole Austrian army, with more extensive powers than had been enjoyed by any commander since the days of Tilly and Wallenstein. He advanced into the heart of Bavaria. Bonaparte, who, on the first surmise of an Austrian war, had left Spain, and flown with his usual rapidity to the armies which stood nearest to the most formidable antagonist, soon collected on the Danube the whole of his forces in Upper Germany; and, after a series of bloody battles, compelled the archduke to take up a position in Bohemia, and the remainder of the Austrian army to retire upon the hereditary states. After a short campaign, unparalleled for the exertions made by both parties, as well as the obstinate valour displayed in every battle fought during its continuance, the fatal approach of a Russian army, and a declaration from its master, "that he made common cause with his ally France," obliged the archduke to recal his brother John from Italy, and to detach part of the main army into Poland and the North. These steps led to the battle of Wagram, and to the armistice and treaty which soon followed, and which have left the Austrian empire in its present state.

Peace of Vienna, or Schonbrunn, Octob. 14. 1809.

Trieste with its territory, Fiume and the Croatian Littorale, part of Carinthia, almost all Carniola, a small part of Upper Austria, with Salzburg and Berchtolsgaden, and a very extensive tract in Gallicia, were torn from Austria by this treaty. She is now totally excluded from the sea, and from direct communication with England, as well as all other countries excepting the conterminous states. Her trade must suffer considerably, and her manufactures will depend in a great measure upon the pleasure of her neighbours.

She is still indeed a power of high consideration, but she can no longer be deemed independent. As long as Russia and France join against the liberties of Europe, it will be in vain for Austria to attempt any resistance. Germany, although, if united, the only nation on the continent able to cope with France, cannot, in its present state, be expected to take part with Austria. The last mentioned has long been regarded by the rest of the empire with a jealous eye. This jealousy has not as yet been quite extinguished by the reverses which Austria has undergone during the long revolutionary wars, of which we have now attempted a rapid sketch. It still actuates the southern provinces, and that too with the same acrimony as it always did the cabinets of Dresden and Berlin.

The degraded state of the princes who at present divide Germany among them, does not permit us to expect any speedy change for the better. A population of 36 millions, however, who speak the same language, and exceed the general mass of European nations in civilization and refinement, as well as in resources and military discipline, cannot always remain sunk in slavery to a foreign power. But whether that nation shall effect its own emancipation by the exertions of its princes and warriors, who may wish to re-establish the ancient order of things; or by a violent revolution, like that which wrought such wonders in France, renovate their political existence; or by what other means it may be accomplished, it would be now hazardous to conjecture. The philanthropist, however, hopes, with fond enthusiasm, to see the blessings of freedom and independence conferred on so respectable a nation; and, amidst the present distractions and horrors in which they are involved, anticipates, with pleasing emotions, the grandeur and happiness which they are destined to attain in some future and more fortunate age.

What effects the recent changes, and the matrimonial connection with the French monarch, may produce on the state of this empire, we cannot pretend to foretel. Many salutary consequences, in the interim, may be expected.* The greatest is, that the monarchy preserves its integrity: for it is not probable, that Austria shall undergo any further dilapidations during the continuance of the present alliance with France; nor is it the interest of Europe that she should. Some years of peace are necessary for re-establishing her public credit, and for restoring to her paper-money the value to which the vast resources of this empire, and the good faith of the government, unquestionably entitle it. Such years she is now in a fair way of enjoying; and such repose is a great blessing after a long series of disastrous wars.

Russia will not soon be in a condition to give her any alarm. Prussia is levelled with the dust. Bavaria will probably receive no more augmentations of territory at the expense of Austria. Turkey will be fortunate if she preserves her own dominions entire. No enemy then threatens to disturb the tranquillity of Austria in her present political attitude: And we may therefore be permitted to hope, that she shall one day recover the rank which she formerly maintained in the scale of our great European powers; that she shall adopt such military and œconomical arrangements as correspond with her immense national resources; and that she shall, sooner or later, prove an useful ally of our country, in checking the usurpations, and restraining the ambition of France.

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* *Bella gerant alii, Tu, felix Austria, nube.*

Austria Upper and Lower, (*ob der Ens, und unter der Ens,*) lies in latitude 47° 20′—48° 57′ north, and in longitude 13° 50′—17° 2′ east of Greenwich. The whole province above and below the Ens, and on each bank of the Danube, is about 140 English miles long, and at an average 70 broad, containing 9800 English square miles, or 6,172,000 statute acres, almost one eighth of the British island. One-third of this extent consists of mountains, forests, lakes, summer grazings, and pasture; and two-thirds of meadows, corn-fields, vineyards, and the scites of cities, villages, churches, and country houses, &c.

Austria is bounded by Bavaria on the west, Stiria on the south, Hungary on the east, and Bohemia and Moravia on the north. It lies almost in the centre of our European population, nearly at the same distance from Madrid and Petersburg, London and Constantinople.

The soil of Upper Austria, especially on the banks of the Danube, and of the larger streams which run into that river, is either a clayey loam, or the deposition of schistus and calcareous rocks, which are hurried down by the torrents from the mountains. In the higher vallies the soil is thinner and lighter, but very sharp and fertile, and upon the whole well adapted to corn and grass husbandry. The climate is there too precarious and boisterous for the cultivation of the vine. The surface of the whole province is a gradual slope from the southern mountains and northern hills towards the Danube, which flows through the heart of the country, and receives every river or stream that pervades it. These rivers run into their majestic receptacle nearly at right angles from both sides, like the ribs into the keel of a ship; and indeed the general surface of Austria bears no small resemblance to the inside bottom of a ship, supposing the ribs to descend gradually and gently, and to be much less straight at a distance from the keel than near to it. The traveller, accordingly, who walks nearly along the banks of the Danube, can see more of the country on each hand, whether he ascend or descend the river, than he can from the banks of any stream of any other region with which we are acquainted. This declivity, which is uniform and gradual for many leagues on each bank, gently facilitates the draining of the ground, and the carriage of bulky commodities from the interior of the province to the markets and places of resort on the river. The ground is accordingly well cultivated, and yields a rich and beautiful prospect. The numerous towns and villages on the Danube; the variegated and majestic woods which skirt the hills that gradually rise on either hand; the monasteries, castles, spires, farm-houses, and villages, here and there peeping out from the trees; the roads crowded with carriages, travellers, soldiers, &c.; and the river with swiftly-sliding barks now and then appearing and disappearing amidst its wooded islands; the whole scene crowned by a fantastically varied range of distant mountains, frequently re-echoing the solemn peals of church bells or of martial music; all these strike every stranger who visits Austria, in a degree proportioned indeed to their natural effect, but inconceivably heightened both by the unexpectedness of the apparition itself, for which he is never prepared by reading of it in the works of travellers, and by the *bon-hommie* of the natives, and the universal happiness which smiles around.

Mountains.

The most remarkable mountain in Lower Austria is Schneeberg (snowy mountain), which is distinctly seen from the ramparts of all elevated points of Vienna every clear day. Its height is not very considerable when compared with that of many other mountains pertaining to the range of which it forms a part, being only 5200 English feet above the Danube at Vienna, or 6000 above the level of the Mediterranean; but being insulated, almost always covered with snow near the summit, and of a beautiful and majestic contour, it strikes a stranger more than any other mountain in the duchy.

The points, however, from which the traveller, who loves magnificence in natural scenery, ought to take a view of the Austrian mountains, are the following.

1. The bridge over the Trasen, a little to the eastward of the town of St Polten, nearly 30 English miles to the west of Vienna.

2. The rampart, or what is so called, of the town of Ens, a little to the north-east of the square, or market-place.

3. The summit of a pretty high hill, which rises from the eastern bank of the Gmunden Lake, about four miles to the southward of the beautiful and romantic town of Gmunden, in Upper Austria.

It is impossible to conceive any thing finer in mountain scenery than these points exhibit. They defy the power of language to do them justice.

Lakes.

The lake of Gmunden, just mentioned, with the fine river Traun running through it, and the two charming towns of Gmunden and Ebsdorf at each end, about twelve miles distant from one another, is much frequented by Austrian travellers, both by reason of the scenery of its banks, which is variegated and strikingly picturesque, and also on account of the salt springs and salt manufactures, which are found there. From this lake and its vicinity, Austria is supplied with salt to the value of 400,000 pounds *per annum*. The Wolf-gang, the Aber, the Hallstatter, and many other lakes of inferior note, are the boast of the Upper Austrians, and unquestionably afford as fine and varied landscapes as any in Germany. They all abound in trout, (there called *florellen*) pike, (*hecht*), and a variety of other fishes, of which the natives are excessively fond; and they greatly facilitate the carriage of wood to the salt pans, and of all sorts of commodities to the numerous population which dwells along their shores. Let not the traveller who visits them and Upper Austria trust to any map of this country hitherto published, not even to Kinderlin's, who pretends to have drawn his from actual observation and real survey. They are all absurdly wrong and false, and will infallibly mislead any one who depends upon them. The best map is Chauchard's, and yet it is also extremely deficient with regard to this rarely frequented, and yet interesting, portion of Germany.

Rivers.

Besides the Danube, which rolls in great and rapid majesty through the heart of the whole duchy, several other rivers of considerable size, and which would be called large in Britain, enrich and adorn the Austrian circle. Of these the principal run from the southward, such as the Traun, the Ens, Ips, Trasen, &c. and are studded with rich and flourishing towns or villages on their banks. Wooden bridges are generally used, but they are well contrived, strongly built, and perfectly safe. Vast quantities of timber are floated down these rivers annually from the higher country forests, for fuel to the inhabitants of the champaign districts. The carriage and preparation of this fuel yields employment during winter and spring to one fourth of the population. The Austrian rivers vary greatly in colour, not only from one another, according to the nature of the channels in which they run, but also from themselves at different seasons of the year. The Danube alone retains a yellow colour all the year round. No green can be more lively or beautiful than the waters of the Traun and Ens, until they begin to be affected by the autumnal rains. Near their sources, amidst high mountains, of from six to seven thousand feet above the level of the Danube, their waters are always green, and impregnated with fine particles of schistose and calcareous sand, which are supposed, in those exalted regions, to produce the swellings of the glands of the neck, which are here so common, and in Switzerland, as well as in Austria, are called *kropfe*, in France *goitres*. We met with some families in the higher vallies, who observed the constant custom of boiling the water, and allowing it to subside and to deposit this sand for many hours before they drank of it. This precaution they allege to be perfectly necessary, and also effectual in preventing the swelling and deformity in question.

Woods.

The most common species of wood is the alpine pine, which almost exclusively occupies the sides and elevated slopes of the mountains. This the natives call *nadel holz* (*needle-wood*), which constitutes a considerable portion of their fuel, and of the materials of their bridges. Ash, oak, elm, larch-tree, and most of our common forest trees, grow luxuriantly, and afford a delightful variety to their woodland scenes.

However striking to a stranger, especially if he goes from our part of the British island, the quantity of wood may be, which he sees in Austria, yet he will every where meet with grievous complaints of its decline, and the most dismal forebodings of the fatal consequences which must follow it. Certain it is, that the price of wood has risen nearly 80 *per cent.* during the last six years, even making allowances for the depreciation of the paper currency, and the great difference which now subsists between the real and the nominal value of the circulating medium of the country. The same danger from scarcity of fuel, and of wood for other purposes, is apprehended all over the west of Europe; and we every where hear the same alarming invectives against the improvidence of present occupants, and the mismanagement of their rulers.

The climate varies greatly from the mountainous frontiers of Stiria and Bohemia, to the lower borders of Hungary and the banks of the Danube. In the former, the cold is in winter intense and persevering; storms and rains frequent, violent, and destructive; the summer is usually short and precarious; and the hopes of the husbandman are often blasted by frosts and tempests in the autumnal months. The average quantity of rain that falls at the towns of Gmunden and Hallstadt in Upper Austria, which are encompassed by mountains, and lie on lakes which give them their names, is 38—46 inches, while the quantity which falls at Vienna rarely exceeds 28. The medium temperature of springs in the high country is 42°, that of springs on the Danube 44°—46°. In these mountainous regions, the winter sets in with considerable severity about the end of October; and the ground is for the most part covered with snow until the middle of March. Partial thaws, indeed, sometimes occur, but they are of short duration, and do more harm than good. Very little can be done in the fields before the latter end of March, when the regular thaw commences, and vegetation is re-established in beauty and strength. The transitions from cold to heat, and *vice versâ*, are sometimes very rapid and injurious to the human constitution, as well as to vegetation and to animals; but upon the whole, this fine province cannot be deemed unhealthy or unfavourable to longevity. The most frequent instances of advanced old age which we met with, occurred, not as in Norway and Scotland, among the higher regions of the country, but in the deep and sheltered vallies.* Near the salt pans of the provinces, the race of men is slender, pale, emaciated, and feeble [illegible] body, as well as to all appearance weak in capacity and intellect. Whether this proceeds from the [illegible] mosphere which they constantly inhale being impregnated with impure salts and charcoal, so as to affect their lungs too powerfully, or from the nature [illegible] their occupation, which requires their being almost continually wet from head to foot, or from whatever causes it may arise, is much disputed, but [illegible] fact is undeniable. The most common diseases [illegible] those parts of Austria are pulmonary complaints, typhus and intermitting fevers, colds, rheumatism, and epidemical distempers brought from Italy [illegible] Turkey. Southerly and south-westerly winds [illegible] the strongest. These blow from the Stirian, [illegible] rinthian, and Tyrolian Alps, over a snowy region [illegible] several hundred miles in extent. Northerly winds are the pleasantest, easterly the most piercing [illegible] durable.

On the banks of the Danube, and in the lower country, however, the heat is excessive in the [illegible]

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* There appeared few instances of great longevity between 1796 and 1806, and only three, and these doubtful, of 95 and 101 years.

Austria.

of July, August, and September; Fahrenheit's thermometer standing frequently in the shade at 95—98 degrees. On the 25th of August 1805, it was at 97°, and at three in the morning of the 26th it sunk to 54°; so rapid even in the warm months is the transition from heat to cold in this country. Tempestuous winds seldom annoy the lower districts, and the climate is as favourable for animals, for grass, corn, wood, and even some species of wines, as any part of Europe in the same latitude. Lintz, the most westerly city of Austria on the Danube, is said to be 1000 feet above the level of the Black Sea; and Hainburg, near Presburg, the most easterly, is about 780 feet above the same level.

Population in 1806—1809.

Lower Austria	1,062,000	Males	817,230
Upper	646,000	Females	873,194
		Strangers	17,576
Total	1,708,000		
			1,708,000

There were 14,564 marriages, 65,139 births, and 66,023 deaths.[*] The number of families was 360,555, which gives nearly 4⅔ to each family. There were 3997 nobles, and 4480 clergymen. The cities amounted to 51, towns to 333, villages to 10,728, and the houses to 249,614.

The population of the most considerable places was as follows, viz.

In Lower Austria.

	Inhabitants.	Houses.
Vienna	256,000	6518
Krems	7,000	620
Wiener Neustadt	5,000	550
Waidhofen	4,300	535
Kloster Neuburg	3,026	456
St Polten	2,960	410
Korn Neuburg	2,500	370
Baaden	2,000	270

In Upper Austria.

	Inhabitants.	Houses.
Linz, or Lintz	17,900	1006
Ens	4,400	540
Freystadt	4,000	460
Wells	3,300	376
Gmunden	3,000	310
Reid	3,000	299
Hallstadt	2,800	281
Steyer	2,200	370

From the Tables which we have seen, it appears, that the population of Austria has been rather increasing for the last 30 years, in spite of the bloody wars which she has carried on during that eventful period. This must, in some measure, be ascribed to the influx of foreigners from her distant provinces to Vienna, as well as to the numerous public academies and other literary and military establishments which that capital contains. Vast numbers of Bohemians, Moravians, Stirians, and Italians, are found among the common labouring and manufacturing classes in Vienna, who, although they banish none of the native Austrians, or perhaps greatly add to the population which that metropolis would at all events contain, yet greatly augment that of the province, by keeping in the country, and in its towns, persons who would otherwise flock for employment and high wages to Vienna.

Religion.

The Roman Catholic is the established religion of Austria; but since the reign of Joseph II. Protestants of every description, as well as Jews, Greeks, Russians, and Turks, and in short persons of every persuasion, enjoy full toleration and security. We found a respectable Lutheran and Presbyterian chapel in Vienna, and in Upper Austria there are many thousand Protestants, who have their regular stated clergymen preaching to them in full freedom, and discharging their ministerial and clerical functions as much at their ease as if they were in England. There are indeed in Austria eleven Protestant parochial charges or parishes, the incumbents of which enjoy competent salaries from their flocks, and are much respected by their Roman Catholic neighbours. So far indeed were we from meeting with any of the intolerance and bigotry, of which we read the most exaggerated accounts in books of travels, that, although occasionally residing for years in this province since 1796, not a single instance of any thing approaching to persecution or intolerance occurred in our experience. The Austrian is indeed attached to his own religious ceremonies, and wishes them to be treated with respect and decency by others; but he never interferes improperly, nor displays any symptoms of arrogance or fanaticism. The pilgrimages which take place to Mariazell, and other celebrated cells in Austria, are indeed often extremely ridiculous, and accompanied by scenes which excite much mirth among strangers: but to those who have seen the superstitions of the East, or the buffooneries and absurdities of Italy, Spain, and Portugal, they will appear to approach rather to innocent recreations, than to degrade the persons concerned in them from that rank as reasonable beings, with which the gross fooleries of superstition are frequently incompatible. Neither the Austrian clergy, nor the teachers of youth, are responsible for the remains of ancient and traditionary customs, to which their people still cling with fond enthusiasm; nor can we impute to them any more collusion in misleading them, or suffering them to be misled, than we can to our own Highland clergy and schoolmasters for permitting a belief in witchcraft and the second sight.

The best proof of the efficacy of religion is to be deduced from the morals of a people. No nation in Europe is less stained with public crimes than the Austrian. In none do we find fewer vices, less disorder, and more good nature, kindness, charity, and genuine humanity. Murder, and the atrocious crimes, are never heard of. Theft is extremely rare, forgery almost unknown, and bankruptcies and similar practices, so common in England, are regarded with abhorrence. Drunkenness scarcely ever appears in public, as in our streets; and when it does, it is not in the frightful and hideous form of rage and fury, but a mixture of mirth and infantine folly, such as is described by Anacreon. If religion is to be judged by its fruits on the character, therefore, it will surely require an uncommon share of hatred to popery to reconcile us to the belief that that of the Austrian is a very bad one.'

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[*] The great proportion of deaths may be accounted for by the number of infirmaries and hospitals in Vienna, where many thousands die annually who are sent thither for medical aid from all quarters of the empire. Nearly one half of them are sent when given up by their provincial physicians.

The great objection to the religious system of this fine principality, is its expensiveness. The church draws very nearly one-eleventh of the gross produce of the land, and a good deal more than one-fifth of the gross rental of the province. The rental, or portion, which is paid to the superiors of the lands by the peasants, who possess them in property, but pay heavy feus to those superiors, amounts to nearly five millions sterling annually; and the ecclesiastical establishment costs one million, or nearly six times as much as that of Scotland, of which the population and revenues are nearly upon a par with those of Austria!

Public instruction.

Intimately connected with the religion of every country must be its public instruction in morals and science. There are in Austria 1151 primary or elementary schools, in which reading, writing, the principles of Christianity, and the common rules of arithmetic, are taught. There are 22 normal, and 14 principal schools for the learned languages, mathematics, belles lettres, and such branches as are usually taught in our academies, five gymnasia or colleges, and one university, viz. that of Vienna. This last is celebrated for its anatomical and medical school. The funds for the maintenance of these establishments are principally supplied by a land-tax, similar to our assessment for parochial schools; but there are also other funds of considerable amount, arising from the portion of the revenues of suppressed convents and monasteries, which have lately been appropriated to this purpose. In general the Austrians are much upon a par with the rest of the south of Catholic Germany in point of education; but they are greatly behind the Protestants of the north, and even of those of Swabia and the Palatinate. On looking into their churches, however, on Sundays, calendars and prayer books are seen in almost every one's hands, so that reading is universally understood. They pay too little attention to history, geography, and the state of the world around them, and seem to care for nothing beyond the limits of their own province. Many peasants of the better classes gravely asked us, "On which side of Russia was England? and, How many days sailing London was distant from France?" On shewing them the map of Europe, they could not conceive why the French armies should get easier access to them than to us, or how it could happen that so trifling a spot as Britain should subsidise Russia and Austria, and set the power of the continent at defiance. This sort of ignorance, however, is not peculiar to the Austrians; it is found among the common ranks in some degree everywhere, excepting in Great Britain and the west of France.

Bodily appearance of the Austrians.

The Austrians are, generally speaking, a handsome and athletic race, composed principally of Germanic materials, but mixed with the productions of Hungary, Italy, and Bohemia: hence the darker complexion and blacker eyes, the bolder features and the more animated expression of the Austrian than of the Westphalian, Saxon, Prussian, or Franconian; and, probably, that beauty of face and person which is perhaps incompatible with successive uniformity of parentage, and which we find most perceptible among nations composed of mingled tribes. How different is the aspect of an English assembly from that of a Bengalee or a Chinese? In like manner the Austrian form and countenance are probably improved by the frequent intermarriages of the natives with their neighbours; and they partake of all the charms of variety, and of the interesting novelty of what we may almost call an harmonious contrast. In a family, of which the father is the son of a Croatian officer, who settled in Austria in his youth, and the mother an Upper Austrian lady, we saw the Grecian profile and eye-brows in the face of the eldest daughter, and opposite to her, at table, the mild blue eyes, fair complexion, and gigantic well spread chest of a genuine son of Hermann, in the figure of her brother. Of six children, the shape and expression of countenance were, in like manner, singularly divided, or rather moulded, as by a finer medium than that of either parent, into something resembling both indeed, but greatly superior to either. The family in question was uncommonly handsome, and probably more so than that of any indigenous Austrian pair.

Analogous to their natural constitutions and varieties of form, are the manners of the Austrian population. They may justly be called a sensual people, in the same manner as the aggregate of the European population deserves that title; *i. e.* they shew every inclination to gratify the propensities by which they are most powerfully solicited. They are as fond of dancing, noise, and gallantry, as the French; they have no more objection to a good dinner and a bottle of wine than an Englishman; no Italian can be more passionately enamoured of music; no Neapolitan of high sounding titles, of finery in clothes and equipages, or of religious parade; and no school-boy of play in every possible shape. This variety of tastes for pleasure may probably arise from the cause to which we have alluded: it has certainly stamped upon this people the impression of a sensual nation. But what holds true of few other nations, is strictly just when applied to the Austrian: they can rush from the ball or the banquet into the field of battle, and seem to enjoy the terrors of war no less than the pleasures which it destroys. Their sensuality never unmans or enervates them. Their hearts are as unsusceptible of fear as they are alive to delight; and nature seems to have given them the faculty of being contented in every place and emergency, whether in the comic theatre or the scene of blood, and whether running to their nuptials or to their graves. Nor is this equanimity the child either of phlegmatic indifference, or philosophical calculation: It is the effect of a constitutional felicity upon a people who have rarely felt either political oppression or religious persecution. The great mass of the population seem to be much at their ease: their houses are large and commodious; their lands fertile, and comparatively well cultivated; their cattle, horses, and domestic animals, well fed and judiciously managed; and their country better supplied with roads, bridges, salutary municipal regulations, (and these, too, pretty well executed,) than any other province in Germany. From a long enjoyment of those advantages, and a consciousness of them, the general appearance of contentment and happiness which occurred in this fine province, as often as we visited it, in spite even of war and its attendant calamities, may be in some measure derived. That the national character is agreeable to a stranger to contemplate it, is certain; and therefore he willingly dwells on any peculiarity which may rescue his speculations from the charge of a tedious and impertinent minuteness, while he describes the manners of a district, which, lying nearly in the centre of Europe, and having frequently made a figure in our history as the point of union of a powerful monarchy, might be supposed to be abundantly familiar to us in all its aspects.

Of the peculiarities which we remarked in the character of the great body of the Austrians, especially when travelling through the country at a distance from towns, we mention three as the most conspicuous.

1. The Austrian betrays complete indifference about public affairs, whether they respect his own country or Europe, and the world in general. He never asks for news, or listens to any discussions upon politics, or indeed any other general topics of a serious cast, but with the most evident indifference, or even aversion. In no company is there a word heard concerning any public transactions or characters; and if a stranger chances, out of mere lack of conversation, and to avoid the necessity of yawning, to make any allusion to subjects which he might think interesting to all who hear him, he is soon constrained to change his topic by the mortifying apathy with which his observations are received. We first imagined that this disposition to reject every thing serious or valuable in public life, as the occasional ground of converse, arose from timidity and the fear of giving offence to the government, or to persons in power; and we had frequently heard this reason assigned by the northern Germans as the cause of what they are pleased to call *Austrian slavery and submission;* but this is a mistake. The Austrian loves his sovereign, perhaps more than any other European, and has indeed good reason for so doing, in as far as the mildness of the government, and the humanity of its civil polity, are concerned. But this love does not incite him to any talking, or any praises. Neither do the reverses experienced by his prince extort from him any censure of the government, or any impatience under a system which threatens the dissolution of the monarchy. He seems to be naturally and instinctively averse to any speculations upon such matters, and to have received from his first entrance into the world, a bias the very reverse of that which is the characteristic of the British character. What a contrast, indeed, do these two yield on a stranger's arrival in a remote valley in Upper Austria and in the Highlands of Scotland! The Austrian landlord receives him with a good natured countenance, and slowly shews him a room, and asks what he wants to have for dinner, &c.: then, perhaps, enquires about the roads, and what he paid for his horses and carriage; and how long he has been in Austria, &c.; but never dreams of asking news, or talking of any thing connected with public affairs. The Highland Scot torments his guest with a torrent of questions. "Whence he came to-day? Has he seen the last newspapers? What he thinks now of our ministry? How are matters going on in Germany, Spain, India, America, and in all parts of the world?" with a geography of which he betrays a most wonderful acquaintance and familiarity; and, When this war is to have an end? What he thinks of the last taxes, of the local militia, of the national debt now amounting to £500,000,000, and of the general state of the country?

2. A striking peculiarity in the Austrian character, is the union of great physical vigour and ardent love of pleasure, with the most astonishing self-command, forbearance, and good nature. Quarrels, even among persons intoxicated with spirituous liquors, are the most harmless things imaginable. They hardly ever come to any height, even in words; blows are scarcely heard of in many towns during a whole year; and maiming or murder is, on such occasions, completely unknown. There is probably more blood shed at one country market in Ireland, or at a quarrelsome drinking match in Wales, or the Highlands of Scotland, in one evening, than in the whole of Austria in twelve months.

3. An amiable peculiarity in the Austrian character, is the profound veneration paid to the memory of their deceased friends. This is the more striking, because the people are generally reckoned giddy and thoughtless, and believed to be affected chiefly by objects of present sensation. The proofs of it, however, constantly appear. Wheresoever a person has perished, either by a fall from a horse, by drowning, by being crushed to death by a tree or a carriage, or in short in any way out of the common run, a board, containing an inscription and paintings relative to the event, is hung up on the spot, and stands for many years as a monument in honour of the departed. Such boards or tickets, sometimes attended with considerable expense, are particularly numerous on the banks of lakes, and near precipices, and the ferries or fords of rivers. We have never seen any of them which exhibited marks of wantonness in being defaced by boys or passengers. The natives regard them with profound veneration, take off their hats as they pass by them, and mutter a prayer for the happiness of their friends. There is something peculiarly affecting in seeing this done with folded hands by young boys and girls as they go to the schools.

Consistent with this custom is the decency of their funerals, and the decorous state of their churchyards and tomb-stones. Nothing can exceed the care with which these are preserved, and nothing but sincere respect for the relation which once subsisted between the deceased and those whom they have left behind them, could prompt the latter to give so conspicuous an evidence of it.

Amusements of the Austrians.

The common amusements of the Austrians are shooting at a target, playing at ninepins, here, as in Saxony, called *kegel-scheiben*, billiards, cards, dancing, (of which they are extravagantly fond,) and musical parties. They have no amusements which, like those of the British, cricket, golf, quoits, and wrestling, can be properly denominated athletic; nor do even their boys try their courage and strength by these violent, yet useful competitions, with which our youth are early initiated into the struggles and difficulties of life. A stranger is much struck with the placid and quiescent aspect of the German boys in general, but still more so with that of the Austrian, who are healthy, well fed, and evidently happy, although that happiness bears no resemblance with the loud, and sometimes mischievous and tempestuous, mirth of the Britain.

Dress and stature.

The average Austrian stature of men is 5 feet 7½ inches, and of women 5 feet 3 inches English measure; but many instances of great stature occur, especially in the lower and fertile districts of the province. Their dress has nothing particular in it. We found no traces of the *characteristic bigotry* and immorality with which some persons have, in other Encyclopædias, reproached this faithful and gallant nation: on the contrary, we can, from experience attest, that such reproaches are ill founded and calumnious. Englishmen ought, of all other travellers, to be the last to take up and circulate reports injurious to a country in which they are particularly well received; and it is but bare justice to the Austrians to say, that, in point of religious toleration, of good order, humanity, honesty, and whatever constitutes the public and private *morality* of a people, they are excelled perhaps by none on the continent of Europe.

Productions.

Few countries are more productive than Austria in proportion to her extent, whether we refer to the animal, the vegetable, or the mineral kingdoms. Her breeds of horses, mules, asses, cattle, sheep, goats, hogs, and of all the common European domesticated animals, as well as of game and wild fowls, are acknowledged to be among the best in Germany. In 1798, there were 97,684 horses, and 112,162 head of cattle in Lower Austria, and probably one-third of those numbers in Upper Austria, and that too without reckoning the cattle destined for the shambles of Vienna, which last amount to nearly 80,000 at an average yearly, and 54,000 calves. (See VIENNA.) Much attention has been paid since the reign of Joseph II. to the breed of horses in Austria, by introducing English, Mecklenburgh, and the best Turkish stallions, and by encouraging English grooms to settle in the country. Nothing very particular, however, can be said in favour of their management of live stock; and productive as the province is, they must long continue to import considerable quantities from the adjoining provinces of Hungary, Bohemia, and Moravia, in order to meet the constantly increasing demands of Vienna. The same may be said of the other productions of the province, such as wood, wine, corn, fruit, oil, wool, iron, lime, &c. excepting the article of salt, which Upper Austria produces in quantities, not only adequate to the supply of the province and metropolis, but also sufficient to afford a considerable surplus for exportation.

Agriculture.

Austria, when compared with the mass of the continental provinces of northern Europe, may fairly be stiled a well managed and rich agricultural country. On entering it, either from Hungary on the east, or from Bavaria on the west, we find a striking contrast in its favour. The country is pretty well and regularly enclosed, especially Upper Austria; a sort of rotation of white and green crops is observed; and the raising and harvesting of hay are perfectly well understood. Draining is not, indeed, scientifically practised, but embankments against lakes and rivers are very skilfully constructed, and kept in admirable condition all over the province. Irrigation is well managed, and carried on to a great extent, being found of vast advantage in a country which has abundance of running water, and of which the soil is for the most part rather light and gravelly than otherwise. The roads are good, and, upon the whole, well managed, though not always well engineered when first made, being, as in many parts of England, carried over the summits of hills and eminences that might have easily been avoided; and in some parts of the level country, where land is valuable, too narrow in proportion to the great resort upon them. With regard to these hills, and all other dangerous or difficult parts of the road, the Austrian police shews great tenderness and humane attention to the people who pass by them. A ticket upon a tall pole, somewhat like a road-index, is placed in a conspicuous station by the road side, with the figure of a man crushed to death painted upon it, over whom a wheel has passed, while he was in the act of fastening a drag-chain to his cart or waggon; intimating, the dangerous consequences of neglecting that precaution till the horses were so pushed by the weight of their draught, that they could not command themselves. A fine to a considerable amount is also named on the same ticket, to be paid by every driver of a loaded carriage of whatsoever description, who shall not fasten his drag-chain to such carriage at the very place where the ticket is hung up. A reward is offered to informers; so that serious accidents, so frequent in Northern Germany, and other parts of Europe, very rarely happen in Austria, even on its steepest roads. The crops commonly cultivated are wheat, (in no very considerable quantities) barley, oats, rye, pease, beans, potatoes, saffron, mustard, hemp, flax, wood, and a few species of grasses, as clovers, vetches, tares, &c. In comparison with Northern Germany, (excepting some parts of Mecklenburgh and Holstein,) the crops are heavy and productive; but if compared with the best managed counties of England and Scotland, they are by no means considerable in proportion to the fertility of the soil. Six bolls, (Linlithgow measure,) or three quarters of wheat, are reckoned a good crop per acre, and four bolls of barley or oats rather exceed the common average. The Austrian peasant is not a *tenant*, in our sense of the word, but a feuar; he has his land very cheap, and calculates not upon what a certain quantity of seed corn will yield him. Hence he sows very sparingly, perhaps six or seven pecks, or two and a half bushels per acre, and is perfectly contented if he has six or seven returns from his seed. He ploughs to the depth of two, or at most three inches, and manages his ground precisely as his forefathers did in the days of Charles V., or of Rudolf of Habsburg. A great branch of husbandry in the country eastward of the Ens, and in which the natives excel most of their neighbours, is their wine. Perhaps one-sixth of the arable land of the whole of Lower Austria is occupied by vineyards, and these pay at least one-fourth of what we call the landed rent of the province. The wine here made is a white wine of an acid taste, which, when kept for a year or two, is both palatable and wholesome, improves till the age of twenty years, and sells in wholesale from the cellar of the Vienna merchant at eight-pence sterling a bottle. The quantity consumed in Vienna and the province is prodigious, and, together with what is exported to the northward, amounted, at an average of ten years preceding 1809, to the sum of ten millions of florins, or £800,000 *per annum*. The vineyard husbandry is the most laborious of all others, and makes the most attentive and regular farmers; hence the appearance of steady and systematical industry, which delights the traveller who comes into this province from any of the northern, western, and eastern provinces by which it is surrounded.

Austria is a considerable manufacturing province. Vienna alone contains 54,000 manufacturers in woollens, silks, cottons, leather, iron, steel, glass, porcelain or china-ware, paper, toys, household-furniture, dress-making, &c.; and exports, to the different provinces of the monarchy, the value of £1,200,000 sterling *per annum* in manufactured goods. Lintz, in Upper Austria, has a cloth manufactory, which, in 1805, employed 3000 workmen in the town, and 7000 in the neighbourhood; and several towns on the northern side of the Danube possess woollen manufactures, though of inferior consequence. They are still greatly inferior to similar establishments in England and France; but make a conspicuous figure in Germany. The articles which they yield are, at an average, 30 *per cent.* dearer, and sometimes above 60 *per cent.* dearer than the same articles in England, in proportion to their intrinsic value. The same may be said of their silks and cottons. The numerous prohibitory restrictions, and heavy imposts, are not only detrimental to the province with regard to its foreign commerce, but also extremely pernicious to the internal improvement of the different provinces of this empire. Joseph II., who rushed upon every project without mature deliberation, fancied that manufactures would flourish in consequence of prohibiting almost all goods of foreign fabric; but he lived long enough to see, that prohibitions, like all other legislative interferences with the commercial polity and national industry of a country, must be very cautiously managed, in order to produce any good effect; and that it is the wisdom of governments, rather to foster and direct the national energies, than to impel them by violent measures, or in any case substitute coercion in place of persuasion, and of gradual illumination and advancement.

The revenue of Austria Proper is usually estimated at one-sixth of that of the empire, which, in 1808, amounted to nearly £9,000,000 sterling. This very considerable sum of £1,500,000, which exceeds some of the northern monarchies of Europe, arises from various sources, of which the metropolis Vienna furnishes a large share. A tax on offices, places and pensions, lottery, stamps, bank, the house and land tax, post-office, the heavy duty on salt, amounting nearly to 200 *per cent. ad valorem*, the duty on tobacco, mines and minerals, silks, cottons, and all imported merchandise, even articles of luxury and of common use from Hungary and Bohemia, the duties paid by breweries and distilleries, as well as by wines, whether consumed in the province, or exported, &c. comprehend the principal parts of this revenue. It is difficult to discover the precise amount of the revenue of any specific province of the Austrian empire, and, indeed, that of the totality of it; insomuch, that authors, who treat of the political state of this country, are all at variance upon it. Ockhart states the revenues of the empire at 110,000,000 of florins; Hock at 100,000,000; the Political Journal of Frankfort at 93,193,000; Norman at 120,000,000; and others fluctuate between 80,000,000 and 130,000,000. The florin is between 1s. 3d. to 1s. 8d. sterling.

Austria.

Debt.

The national debt of the Austrian empire it is impossible even to guess at with any tolerable degree of confidence. In Vienna it was commonly said, in 1807–8, to exceed £80,000,000 sterling; and supposing Austria Proper to have incurred one-sixth, it has a burden of £13,000,000 and upwards to liquidate from a revenue of £1,500,000.

Army.

Amidst the present uncertainty and rapid vicissitudes of the continental powers, which may to-day possess numerous and well-appointed armies, but to-morrow see them annihilated by a preponderating and overwhelming conqueror, it is not a matter of very great importance to inquire into the precise numbers or organization of their standing armies. The Austrian army, unquestionably the best appointed and the most powerful, upon the whole, excepting the French, stood as follows in 1804 and 1805, and in March 1809 very nearly on the establishment of 1805:

	Men.
Peace establishment of 1804, ...	370,945
War establishment of 1805, ...	471,312

The Infantry, 271,871 men, was as follows, viz.

	Reg.	Batt.	Comp.	Men.
1. Troops of the line,	63	189	1008	193,587
2. Grenadiers, ...		21	126	14,364
3. Chasseurs, ...	1	2	10	2,140
4. Frontier militia, ...	17	246	144	53,000
5. Garrison troops, ...	3	7	28	7,000
6. Invalids, ...		5		1,780
			Total, ...	271,871

Every regiment of the line consists of two companies of grenadiers, of 99 men each; two field battalions of six companies, each company of 182 men; and a depot battalion, always engaged in recruiting and disciplining for the regiment, consisting of four companies. The compliment of each regiment of the line is 3175 men. The grenadiers are men picked out of the regiments; not the tallest, as with us, but those who appear to be the best soldiers. Thirty-nine regiments of the troops of the line are always in garrison in Austria, Bohemia, Moravia, and Silesia; and seven in Gallicia. These provinces are divided into circles, for the purpose of maintaining and recruiting them. Hungary keeps up 12 regiments, which forms a corps of 47,000 men, and are recruited in that kingdom. The frontier militia towards Turkey, consisting of 53,000 men, enjoy free lands instead of pay in time of peace; but the moment they are under marching orders, or put on the war establishment, their regular pay commences like that of the other troops. Some of these regiments, especially those of the Bannat of Temeswar, are very strong, consisting of 4215 men each.

Of this number of infantry of the line and militia, Upper and Lower Austria supply about one-tenth, or nearly 20,000.

The cavalry, 50,800 men, was as follows, viz.

	Reg.	Divis.	Men.
1. Cuirassiers, ...	8	24	9,600
2. Dragoons, ...	6	21	8,000
3. Light horse, ...	6	24	9,480
4. Huzzars, ...	12	48	18,980
5. Hulans, ...	3	12	4,740
Total, ...			50,800

Of these Hungary furnishes 18,000, which she recruits and maintains. Austria Proper contributes only one-twelfth, or 4200 men, and has usually but a few battalions in her garrisons.

The artillery was as follows, viz.

	Reg.	Batt.	Comp.	Men.
1. Field artillery, ...	4	16	64	12,800
2. Artillery-men, ...		1	4	1,274
3. Miners, ...			4	640
4. Sappers, ...			3	280
5. Bombardeers, ...			2	200
6. Pontoneers, ...		1	6	600
7. Engineers, ...				200
Total, ...				15,994

The artillery is furnished with recruits by the infantry, or by regular recruiting for the corps itself.

There are independent companies attached to the army, which amount to 12,000 men, and the emperor's body guard, consisting of the noble guard of Germany and Hungary,—the former 102 men, and the latter 69, all cavalry; and of 109 men of foot guards, who always reside in Vienna, and near the emperor's person.

The army expenditure amounts, in time of peace, to nearly two millions sterling, and in time of war to six or seven millions.—The following is given by some authors as the state of the Austrian army, at different periods of the monarchy, viz.

	A. D.	Men.
Under the Emperor Ferdinand II.	1629	150,000
Leopold I.	1673	60,000
Joseph I.	1706	133,000
Charles VI.	1735	150,000
Empress Maria Theresa,	1746	200,000
Under the Emperor Joseph II.	1788	364,000
Francis II.	1809	470,000

By the late treaty with France, Austria has lost about one-eighth of her population, and one-tenth of her resources; but she is still a *very respectable power*, and fully able, with proper management, to maintain her old military establishment, and even to increase it. Hungary alone contains a larger population than the Prussian monarchy ever did, and is much richer in every point of view, yet that kingdom has never supplied Austria with 100,000 men in any war, and Prussia had, in 1806, a regular army of 230,000 infantry, and 34,000 cavalry.

The Austrian empire consists, (in 1810,) of the following countries, which see in their order, viz.

	Inhabitants.
Austria Proper, ...	1,708,000
Bohemia, ...	3,022,600
Bukowina, ...	250,000
Carinthia, part of, ...	160,000
Carniola, part of, ...	20,000
Croatia, part of, and Sclavonia, ...	500,000
Hungary, with Transilvania, ...	11,500,000
Gallicia, Eastern, ...	3,650,000
Moravia, with Silesia, ...	1,655,000
Stiria, ...	860,000
Total, ...	23,325,000

For farther information respecting the history and statistics of the Austrian empire, see *Geographie und Statistik der ganzen Osterreichischen Monarchie*, von K. Hammerdorfer, Leipzig, 1793. *Special-Statistik von Osterreich*, von. J. de Luca, 1797—8. *Statistisches Gemälde von Osterreich*, V. And. Demjan, 1796. *Gemälde von Osterreich nach den Neuesten Statischen Anweisungen*, V. Demjan, 1804. *Statistische Skizze der Osterreichischen Staaten*, von J. M. von Leichtenstern, 1800. *Uber die Lage, Grösse, und Volksmenge der erblichen Osterreichischen Monarchie*, V. Leichtenstern, 1802. *Topographie und Statistik der Verschiedenen Osterreichischen Provinzen*, von F. W. Weiskern. *Inner Osterreich*, von Kindermann, 1790. *Uber die grösse und Volksmenge der Ost. Staaten*, von Hock, 1794. *Bohmen*, von J. Schaller, von Riegger, Stransky. *Ungarn*, von Windisch Schwartner, Korabinsky, Newotny, Berzeviezy. *Steyermark*, von Cæsar, Kindermann, and Leichtenstern. *Mähren*, von Schway. *Siebenburgen*, (Transilvania) von Ballman. *Gallizien*, von Hoppe. *Illyrien*, von Engel. *Almanack der Kaiserlichen Armee. Hof und Staat Kalendar. The Travels of* Kuttner, (an excellent work,) Gerning, Haquet, Esmark, Hoffmansegg, Forti, Nicolai, Riesbeck, *&c.* *Tableau Statistique*, de M. M. Raymond et Roth, 1809, &c. See also BRITAIN and FRANCE. (M)*

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* For the preceding valuable article, and the article AUGSBURG, the Editor was indebted to his friend the late Mr James Macdonald, a gentleman who was distinguished by the extent of his learning, and the native acuteness and vigour of his mind. A long residence in Austria, and other parts of Germany, enabled him to give a faithful and original picture of that interesting country, and the Editor looked forward with no common gratification to the important assistance which he should receive from him in the subsequent part of this work. A fatal disease, however, disappointed the expectations of his friends, and terminated his valuable life on the 18th of April 1810, in the 39th year of his age, when the preceding article was put to press, and when he was about to finish an interesting work on the agriculture of the Western Isles.

AUTENIQUA, a district of Africa, situated to the east of the Cape of Good Hope, and inhabited partly by Dutch colonists. Vaillant considers it as the most beautiful country in the world. The Dutch planters rear cattle, make butter, collect honey, and cut down timber, for the supply of the Cape. A more particular account of this district may be seen in Vaillant's *Travels*. (*j*)

AUTHENTIC Chords, in Music, are such common chords as have the 4th uppermost, as $\begin{matrix}\text{4th}\\ \text{III}\\ \text{3d}\end{matrix}$ or $\begin{matrix}\text{4th}\\ \text{3d}\\ \text{III}\end{matrix}$ See Common *Chord*. (ϱ)

AUTHENTIC Melodies, in Music, are such whose principal notes lie between the key-note and its octave. See Dr Callcot's *Grammar*, Art. 184.; and Plagal *Melodies*. (ϱ)

AUTOGRAPH, from αυτος and γραφω *to write*, is the original handwriting of any person. (*j*)

AUTOLYCUS, a Greek mathematician, was born at Pitanea, in Æolia, now the Lipari Isles, and flourished about the year 336 before Christ. He was mathematical preceptor to Arcesilaus, the disciple of Theophrastus; and it appears from a passage of Simplicius, that he proposed some hypotheses for explaining the motions of the stars, and was the author of some additions to the theories of Eudoxus. In his two works, entitled *De Ortu et occasu Siderum*, and *De Sphærâ Mobili*, the doctrine of the sphere, and various phenomena connected with the rising and setting of the stars, are rigorously demonstrated by the theory of spherics. See *Diogen. Laert.* lib. iv. p. 29. Simplicius *De Cælo*, lib. ii. com. 46. Fabric. *Bibl. Græc.* tom. ii. p. 89. Montucla, *Hist. Math.* tom. i. p. 210. (*o*)

AUTOMATON, a self-moving machine, or machine so constructed, that, by means of internal springs and weights, it may move a considerable time as if endowed with life. (From αυτος *ipse*, and μαομαι *excitor*.) According to this definition, clocks and watches, as well as mechanical imitations of living animals, are automata.

Automaton.

We are told, that so long ago as 400 years before Christ, Archytas of Tarentum, a Pythagorean philosopher, made a wooden pigeon that could fly. The story is related by Aulus Gellius, who quotes it from Favorinus; but neither have enabled us to understand how the effect was produced. Favorinus says, if it fell it could not raise itself again: and Aulus Gellius adds, that it flew by mechanical means, being suspended by balancing, and animated by a secretly inclosed aura of spirit. *Ita erat scilicet libramentis suspensum et aurâ spiritûs inclusâ atque occultâ consitum*, &c. (*Noctes Atticæ*, lib. 10. c. 12.) Several authors have related, particularly Kircher, Porta, Gassendi, Lana, and Bishop Wilkins, that the famous John Muller of Nuremberg, commonly called Regiomontanus, constructed a self-moving wooden eagle, which flew forth from the city of Nuremberg aloft in the air, met the Emperor Maximilian a good way off coming towards it; and, having saluted him, returned again, waiting on him to the city gates. This story has much the air of a romance, and more especially as some of the authorities, instead of the Emperor Maximilian, call it the Emperor Charles V. his grandson, who was born 64 years after the death of Muller. The same philosopher is also said to have made an iron fly, which, at a feast to which he had invited his familiar friends, flew forth from his hand, and, taking a round, returned thither again to the great astonishment of the beholders. This, if it was really performed, was probably nothing more than a magnetical trick.

M. Vaucanson, so celebrated for the construction of the mechanical flute-player, and mechanical pipe and tabor player, of which a description has been given under the article Androides, also invented a machine capable of imitating all the natural motions of a duck. In external form this machine exactly resembled its prototype: its wings were anatomically exact in every part; and every bone in the real duck had its representative in the autumaton. Not a cavity, a curvature, or an apophysis, but was exactly imitated: the *humerus*, the *cubitus*, and the *radius*, all had their proper movements. Besides this, the artificial duck imitated every natural motion of a real one. It swallowed its food with avidity, exhibited those quick motions of the head and throat which are peculiar to the living animal, and muddled the water which it drank with its bill exactly like the natural duck. It was capable of producing the sound of quacking; and what was perhaps most surprising of all, the food which it swallowed was evacuated in a digested state. M. Vaucanson, indeed, did not pretend to imitate the process of real digestion; but the food evacuated by his artificial duck was in a state very different from that in which it was swallowed; and this alteration was produced not upon the principles of mechanical trituration, but of chemical solution. M. Montucla, speaking of the machines of Vaucanson, says, that the first time he saw them, he immediately discovered some of the artifices employed in the construction of the two musical Androides; but he confesses that the artificial duck entirely baffled his penetration.

Towards the end of the 17th century, Father Truchet, of the Royal Academy of Sciences, constructed, for the amusement of Louis XIV., an automaton consisting of a kind of moving pictures, which was considered as a master-piece in mechanics. One of these pictures, which the monarch called his *little opera*, represented an opera in five acts, and changed the decorations at the commencement of each. The actors performed their parts in pantomime. This moving picture was only 16¼ inches in breadth, 13 inches 4 lines in height, and 1 inch 3 lines in thickness, for the play of the machinery. The representation could be stopped at pleasure, and made to recommence at the same place by the operation of a catch. The account of this piece of mechanism may be found in the eulogy on F. Truchet in the *Mem. of the Acad. of Sciences* for 1729.

A still more extraordinary piece of mechanism is that described by M. Camus, who says he constructed it for the amusement of Louis XIV. when a child. It consisted of a small coach drawn by two horses, in which was the figure of a lady, with a footman and page behind. According to the account given by M. Camus himself, this coach being placed at the extremity of a table of a determinate size, the coachman smacked his whip, and the horses immediately set out, moving their legs in a natural manner. When the carriage reached the edge of the table, it turned at a right angle, and proceeded along that edge. When it arrived opposite to the place where the king was seated, it stopped, and the page getting down opened the door; upon which the lady alighted, having in her hand a petition, which she presented with a curtsey. After waiting some time, she again curtsied, and re-entered the carriage; the page then resumed his place, the coachman whipped his horses, which began to move, and the footman, running after the carriage, jumped up behind it. It is to be regretted, says M. Montucla, that M. Camus, instead of confining himself to a general account of the mechanism which he employed to produce these effects, did not enter into a more minute description. See Montucla's Edit. of Ozanam's *Mathematical Recreations*.

Ingenious pieces of machinery imitating the motions of men and animals are frequently attached to hour clocks, and brought into action at the end of the different hours. There is a remarkable clock of this kind at Lyons, and another at Strasburg. M. le Droz of la Cuaux de Fonds, in the county of Neufchatel, was famous for constructing clocks of this kind. A very curious one, presented to his Spanish majesty, had, among other curiosities, a sheep which imitated the bleating of a natural one; and a dog watching a basket of fruit. When any one attempted to purloin the fruit, the dog gnashed his teeth and barked; and if it was actually taken away, he never ceased barking till it was restored.

Even the clock presented by the Kalif Haroun al Rashid to the French Emperor Charlemagne, deserves to be mentioned as a remarkable specimen of ingenuity, considering the time at which it was made. It was a clepsydra, or clock moved by water. In the dial were twelve small doors, forming the divisions of the hours; and each of these doors opened in succession at the hour marked, and let out little balls, which, falling on a brazen bell, struck the hour. The doors continued open till 12 o'clock, when twelve little knights, mounted on horseback, came out together, paraded round the dial, and shut all the doors. Such a machine might well astonish all Europe, at a time when the learned were wholly occupied by questions of grammar, or scholastic theology. See Bossut's *History of the Mathematics*. (m)

Besides these machines, many of extreme ingenuity have been constructed by skilful artists. Some are complicated, and perform a great variety of motions in the course of which a series of different figures are introduced to view; while others are confined to the action of a single figure, and its appendages. Of the former description are the machines composed of numerous parts, adapted for certain branches of trades and manufactures; or where all the successive operations of mining, carrying, and preparing the ore, are represented; or where cavalcades, processions, or sports, are shown. We have seen automatical exhibitions, imitating cascades of the most limpid water, and the blowing or closing of the petals of beautiful flowers. But the chief object of mechanics has been to imitate the action and faculties of living nature, in which they have succeeded in a manner surpassing belief. What relates to the motion of the human figure, we have treated of under the article ANDROIDES, already referred to; and we shall now continue briefly to advert to those of some animals, in addition to what is above mentioned.

We have seen the figure of a swan as large as life, which gracefully curved its neck, or turned it round as if to dress the plumage of its wings or body. Having done this, it bent down its head, and taking a metal fish in its bill, swallowed it. A peacock also has been constructed, which, by machinery, could erect or depress its crest, and unfold its tail; it could likewise lift a piece of money in its bill, while performing all the motions peculiar to an animated original. Perhaps these figures should excite less curiosity, from their larger size admitting of the greater complication of parts, and the more ample operation of the mechanical powers, at least if we compare them with others. Some automata of animals have been made so inconceivably small, and at the same time exhibiting such a diversity of action, as to claim the utmost admiration, not only of those unacquainted with the principles of art, but of the most intelligent mechanics. M. Maillardet, an artist on whom we before bestowed our commendations when speaking of the Androides, constructed an oval box about three inches in length: the lid flew up, and a bird of beautiful plumage, not larger than a small humming bird, started up from its nest. Its wings fluttered, and its bill opening with the tremulous vibration peculiar to singing birds, it began to warble. After continuing a succession of notes which would fill a large apartment, it darted down into its nest, and the lid closed of itself. The machinery was here contained in very narrow compass, and could produce four different kinds of warbling: it was put in motion by springs, which preserved their action during four minutes. It has often created great surprise how such a variety of notes could be produced within a space where there was evidently no room for a corresponding number of pipes. The artist, however, has accomplished his purpose by a very simple expedient. There is only one tube, the vacuity of which is shortened or lengthened by a piston working inside, and thus producing sounds graver or more acute, according as the machinery operates upon it.

Still more minute is a spider, wholly fashioned of steel, of which we have seen several species. The mechanism effecting the motions of these figures, is included in the body, and by means of various springs, pinions, and levers, the legs are successively raised, and the automaton advances. One constructed by M. Maillardet, ran on the surface of a table during three minutes; and its course was so devised, as to tend rather towards the centre of the table than the edge.

The same mechanic has made an automatical caterpillar, or lizard, and a mouse, all strictly imitating the motions of nature. He has also constructed a serpent, which crawls about in every direction, opens its mouth, hisses, and darts out its tongue. The source of motion, like that of the others, here consists in springs, and it continues in action seven minutes.

Other automata, as a ship on wheels concealed from view, men rowing a barge, the going of mills, and many other operations which require the human hand to regulate them, have often been contrived. But there is one kind of imitation of nature, which, perhaps, infinitely surpasses either the representations of animals or the Androides, we mean the imitation of speech. This may assuredly be considered as the utmost stretch of invention; for of all the faculties conferred on living beings, that which most eminently distinguishes man is speech.

A brazen head, we are told, was once constructed, which is said to have uttered words; but this probably consisted in deception only: nor is it wonderful that it should not have been easily detected, when we reflect on the propensity of the public lately to view one of little ingenuity with admiration. M. Kempelen, however, a Hungarian gentleman, who had previously distinguished himself by mechanical productions, has undoubtedly effected the imitation of speech where no deception is practised. We shall briefly advert to the principles he followed, as we believe no account of them whatever has hitherto been detailed in Britain.

M. Kempelen having directed his attention towards the practicability of forming a speaking machine, limited his expectations to the production of vowels only. At first he entertained no hopes of obtaining consonants, far less did he deem it possible to unite them with vowels, and thus express words or syllables. In the course of his investigations, he tried all musical instruments, even horns and trumpets, with the view of finding which of them emitted sounds approaching nearest to the human voice: but although he was aware that the reeds of hautboys, clarionets, and bassoons, came nearer the voice of mankind, because there is a faint resemblance between their operations and the functions of the human glottis, and also knew that a reed stop, called *voce humana*, had been adapted to organs, his researches were ineffectual. The sound of those reeds was found, on comparison, to be a very imperfect imitation of what they were intended to represent. At length having accidentally heard the reed of a bagpipe, he conceived that it exceeded all others in this respect, and thence made it the subject of his future experiments.

M. Kempelen then proceeded to a minute and assiduous study of the mode in which the human speech is produced, which has led to an interesting dissertation *On the Mechanism of Speech*. There the anatomical position of all the different organs is shewn and described, and also the different relations of each sound to another. After considering these things, he supposed that the fundamental part of voice consists in A. But this was far from aiding his purpose; and he could obtain no other vowel, whether grave or acute, from a reed connected with a tube. However, after long study, he contrived a hollow oval box, divided into halves, which were attached by a hinge, thus resembling jaws. These were adapted so as to receive the sound issuing from the tube; and by means of opening and closing them, he heard the sounds A, O, OU, and an imperfect E; but no indications of I, or the German ü. His attention was next directed to consonants; and after the labour of two years, he obtained from different jaws P, M, L. With these vowels and consonants, he could compose syllables, and even words, as *mama*, *papa*, *aula*, *lama*, *mulo*, because each touch of his instrument produced a different sound. Still he had to conquer a great difficulty in the first letter not having ceased when the second commenced; and on attempting to procure the sounds in immediate succession, the letters were confounded together. *Papa*, instead of being one word, evidently consisted of so many different letters; and also the too sudden discharge of air into the tube produced a faint K. Thus *aula* nearly resembled *ka-ku-kl-ka*. Another imperfection likewise arose in an aspiration following the consonant, and *papa* then resembled *ph-a-ph-a*. As M. Kempelen proceeded in ascertaining the possibility of producing the sound of letters, he surmounted these difficulties, though it cost him a great deal of trouble. But the proper combination of them he saw must result from imitating nature in having only one glottis, and one mouth, from which all the sounds should issue, and where their union should be formed. His invention therefore terminated in constructing a machine which, in some measure, imitated the human speech.

The speaking machine is of simple structure, and consists of only five principal parts. 1. The reed, representing the human glottis; 2. An air chest, with internal valves; 3. Bellows, or lungs; 4. A mouth, with its appurtenances; 5. Nostrils, as in the living subject. We shall not attempt to expatiate on each of these parts, which would lead to a long discussion; and in order to avoid this detail, we shall briefly explain, so far as we are able without figures, the general composition of each. The reed, though not cylindrical, is formed in imitation of the reed of a bagpipe drone, which probably many of those who peruse this article may have seen. The hollow portion, however, is square, and the tongue of the reed, which vibrates, consists of a thin ivory slip, resting upon it horizontally. This hollow portion, or tube, is inserted into the air chest; and the discharge of air occasioning a vibration of the ivory, the requisite sound is produced. To soften the vibration, the part supporting the slip is covered with leather, and a moveable spring, shifting along the upper side of the slip, brings the sound of the reed to the proper pitch. The sound is more acute as the spring is moved forward to the outer extremity, because the vibrations then become quicker; and if shifted farther from the anterior extremity, the sound becomes more grave, as the vibrations are then slower. The extremity of the ivory slip should not be applied close to the tube where it rests, but should remain a little open, that the air may penetrate and occasion the vibration. Thus we observe that a common bagpipe reed may be closed and produce no sound. A slight curvature of the ivory slip arises from the pressure of the spring, which is enough for the object desired.

One end of the air chest, which is of an oblong figure, receives this voice-pipe, as we shall call it, containing the reed; and into the opposite end is inserted the mouth of the bellows. Both the apertures are guarded by leather, to prevent the unnecessary waste of air. Two smaller air chests are then put into it, each having a valve above closed by the pressure of a spring, and each having a round aperture

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adapted to receive through the side of the large air chest a tin funnel, and a round wooden tube for producing hissing sounds as, *s*, *z*, *sch*, *j*. The voice-pipe is placed in the large air chest, so as to be between the smaller air chests.

When all these parts are fitted to the air chest, the operation of one lever raising the valve of the first smaller chest connected with the tin funnel, sounds *s*; while the operation of another, raising the valve of the second smaller chest connected with the wooden tube, sounds *sch*. But it is proper further to explain, that, instead of being a simple funnel, it is in fact a tin box, with a square hole in the outer end, nearly covered by a slip of pasteboard; and the wooden tube is merely the mouth-piece of a common flute, closed at the lower extremity, and with the air-hole modified and contracted. The letter R is produced by the rapid vibration of the ivory slip owing to a strong discharge of air.

M. Kempelen's bellows, which are formed to supply the place of lungs, have no peculiarities. He found that his machine required six times the quantity of air used by a man in speaking. The nozzle, as we have observed, is inserted into the large air chest, and the air which it discharges is also received by the small air chest.

With regard to the mouth, it consists of a funnel, or rather bell-shaped piece of elastic gum, applied to the air chest, and so adapted that the sound of the reed issues from it. Elastic gum is selected for this purpose, as more nearly approaching to the natural softness and flexibility of the human organs. Independent of its communication with the reed producing the sound required, a tin tube connects it with the air chest, by means of which it may be kept constantly full of air. This M. Kempelen considers a very essential, or even an indispensible part of the machine. Besides these there are small additional bellows, for the purpose of aiding the production of such sounds as P, K, T, which need a greater emission of air.

The nose consists of two tin tubes communicating with the mouth. When the mouth-piece is closed, and both tubes remain open, a perfect M is heard; when one is closed, but the other is open, N is sounded.

It is necessary to add to this brief account of the principal parts of M. Kempelen's speaking machine, that the sound was regulated in a great measure by various modifications and compressions of the mouth. Four letters, D, G, K, T, he never could obtain perfectly, and substituted a P in expressing them, which was so managed as to bear a considerable resemblance, according to the mode of using it, and sufficient to deceive the auditor. Nevertheless M. Kempelen could produce not only words, but entire sentences, such as opera, astronomy, Constantinopolis; or *vous etes mon ami—je vous aime de tout mon cœur—Leopoldus secundus—Romanorum imperator semper Augustus*, and the like. We acknowledge ourselves ignorant of the precise figure under which this machine, no less remarkable for ingenuity than simplicity, was ultimately adopted. At first it was exhibited only with the union of its essential parts; M. Kempelen next proposed that it should be an automaton like a child; and although we have reason to believe that his intention was fulfilled, our uncertainty has induced us to place our account of it here rather than under ANDROIDES.

Au

The more complicated automata are greatly prized in the East; and some years ago constituted a kind of traffic from Great Britain. China, we have understood, was the place where the greatest prices were given for them: and we know also, that some automata of ingenious workmanship were carried from this country with the last embassy, as the most acceptable present that could be offered to the Chinese emperor. (*c*)

AUTUN, the *Augustodunum* of the Romans, a city of France, in the department of the Saone and the Loire, situated near the river Arroux, at the foot of three great mountains which supply the town with water. Autun is not distinguished either by its magnitude or its public buildings. The ruins of three ancient temples, a theatre, and a pyramid, and two ancient gates, are the only objects which arrest the attention of the traveller.

In the neighbourhood of this town there are mines of iron, coal, and crystal, and in the canton of Mont Cenis there is a foundery of cannon. A mine of lead, with a mixture of silver, has been discovered near the town; but the expense of working it was not defrayed by the profits. The wood around Autun is very abundant, and is sent in great quantities to Paris for fuel, and for the purposes of carpenters. Population 9176. East Long. 4° 17′ 59″; North Lat. 46° 56′ 48″. See Gibbon's *Hist.* chap. xi. vol. ii. p. 27. See also SAONE AND LOIRE. (*v*)

AUVERGNE, the name of one of the provinces into which France was divided before the Revolution. It now forms the departments of CANTAL and PUY DE DOME, under which articles an account of its soil, productions. &c. will be found. See Gibbon's *Hist.* chap. xxxviii. vol. vi. p. 307. (*j*)

AUXERRE, a town in France, formerly the capital of the Auxerrois in the duchy of Bourgogne, but now the capital of the department of the Yonne. It is situated on the declivity of a hill near the river Yonne, which renders its situation favourable for commerce, and gives it an easy communication with Paris. Auxerre carries on a considerable trade in wines, of which it sends a great quantity to Paris and to the neighbouring provinces. Those of Coulange and Chablis are the most celebrated. The timber, which is also an article of commerce, is brought down by the rivers Cure and Yonne to Auxerre, from which it is sent to Paris by the Yonne and the Seine. The environs of this town are extremely beautiful. The palace of the bishop was one of the finest episcopal edifices in France; and the principal church is also much admired. Population 12,047. East Long. 3° 34′ 6″; North Lat. 47° 47′ 57″. See Peuchet's *Dict. Commerç.* vol. i. p. 672. (*w*)

AUXILIARY SCALES, in music, are, according to Martini and Keeble, any key major with its relative minor, and the attendant keys of each of these, six keys in all. See ATTENDANT *Keys*. (*ε*)

AUXILIARY VERBS, are those which are prefixed to others, for the purpose of limiting their signification. See GRAMMAR. (*j*)

AUXONNE, a town of France, in the department of the Cote d'Or, situated near the river Saone. It is remarkable for a double wall built around it in the 17th century, and for a bridge of 23 arches over the Saone. The principal articles of trade are corn and wood. Population 5282. East Long. 5° 23′ 35″; North Lat. 47° 11′ 24″. See Peuchet's *Dict. Commerç.* vol. i. p. 673. (π)

AUZOUT, Adrian, a French astronomer, and one of the earliest members of the Academy of Sciences, was born at Rouen, and died in the year 1693. The honour of having invented the micrometer has generally been ascribed to Auzout by the French astronomers, but it is now perfectly ascertained, that he was merely an improver of that useful instrument. M. de la Hire, (*Mem. Acad.* 1719), M. le Monnier, (*Hist. Celeste*, p. 2.), and other French astronomers, maintain, that Auzout, at the same time with Picard, proposed to apply the telescope to the quadrant. It is a remarkable circumstance, that both these inventions have been claimed by the English for Mr Gascoigne. Auzout was the author of some ingenious and interesting experiments on the light and heat of the different planets, which are contained in the Memoirs of the Academy, tom. vi. part ii. See Montucla, *Hist. Math.* tom. ii. p. 569. Bailly, *Hist. Astron. Mod.* tom. ii. p. 293, 400. See also the article Micrometer. (w)

AWENYDHION, a name given to a set of enthusiasts in Wales, who are supposed to possess a gift, resembling what is called the second sight in Scotland. See Warrington's *Hist. of Wales*, p. 102. (j)

AWNING, a covering of canvas extended over the decks of a ship, to shelter it from the sun, rain, or wind. See Clerke's *Elements and Practice of Rigging*, vol. i. p. 149, 230. (j)

AXIM, or Akim, a country of Africa, situated on the Gold Coast, and extending about seven leagues from the river Serpentino to the village of Bosna. The French, who were for some time masters of this country, were expelled in 1515 by the Portuguese, who protected themselves by a fort. Axim remained in their possession, and they engrossed all the commerce of the Gold Coast till the 9th February 1692, when the Dutch attacked them, and made themselves masters of the district. Some time afterwards the Prussians arrived, and allured from their allegiance to the Dutch about one half of the natives. The fort belonging to the Dutch is called St Anthony, and that of the Prussians, Fredericksburg.

The soil of Axim is extremely fertile, and produces great quantities of rice, which the inhabitants export to the other kingdoms on the coast for palm-oil, yams, and millet. Its other productions are fruits of all kinds, black cattle, sheep, goats, and fowls. The gold of Axim, which is reckoned the best on the Gold Coast, is a considerable object of commerce. The Dutch have used every exertion to exclude other nations from this valuable traffic; and the negroes find it difficult to deceive them, as the chief village Ahambene, or Axim, is under the cannon of Fort St Anthony. The negroes, however, often carry the gold which they collect in the rivers, and in the interior of the country, to the English and Irish smuggling vessels, from whom they obtain articles of European merchandize at a much cheaper rate than they do from the Dutch.

The inhabitants of Axim also carry on a traffic in ivory and slaves, and likewise in large canoes, which they sell to foreigners for the convenience of landing with facility on their rocky coast. Salt is manufactured in considerable quantities by the female negroes.

The government of Axim is entrusted to two classes of the natives; the Caboceroes, or chief men, and the Muncaroes, or young men. The principles of equity and humanity guide them in the administration of justice, and in the management of their public concerns; but bribery and corruption often defeat the great ends of public justice. See *Modern Univers. Hist.* vol. xiii. p. 391. (Q)

AXIOM, a truth, or proposition, which is self-evident.

AXIS in Peritrochio, or Wheel and Axle. See Mechanics.

AXMINSTER, an ancient town in Devonshire, is pleasantly situated on a rising ground upon the western banks of the river Axe, 26 miles east from Exeter. It is famous for the burying-place of the Saxon nobles, who fell when resisting an invasion of the Danes, in the battle of Bruneburg; and for the monastery which King Athelstan founded for seven priests to pray for the souls of the departed warriors. This building, however, has been almost entirely destroyed, and from what now remains, it is impossible to distinguish either its character or original size. The town contains 406 houses, and is clean, neat, and healthy. It has an extensive manufactory for weaving carpets after the Turkish fashion, whose peculiar make and character have obtained them the name of Axminster carpets. The weekly market, which is held here on Saturday, is reckoned the first in the county. Population 2154. W. Long. 3° 8′; N. Lat. 50° 45′. See *Beauties of England and Wales*, vol. iv. and Polwhele's *Hist. of Devon.* vol. ii. p. 288. (p)

AXUM, a town of Abyssinia, in the province of Tigré, is remarkable only for its extensive and magnificent ruins, from which may be traced its ancient splendour and importance. In one square, which appears to have been the centre of the town, are forty obelisks of granite. On the top of one is a patera, exceedingly well carved, in the Greek taste; but the sculptures on the face of the obelisk are Gothic; and from its form and situation, Mr Bruce supposes it to have been erected by Ptolemy Evergetes, for the use of the philosopher Eratosthenes, in ascertaining the latitude, or, according to others, in measuring the obliquity of the ecliptic. Two flights of steps, several hundred feet long, are the only remains of a magnificent temple; and in the vicinity are a considerable number of pedestals of statues; and the remains of a causeway, formed of large stones standing edgewise, or heaped upon one another.

The ancient city of Axum is supposed, by Mr Bruce, to have been built by a colony of Cushites, or Troglodyte Ethiopians. It was one of the most flourishing and populous cities of Abyssinia, and it continued to be the capital of the kingdom till the beginning of the 16th century, when it was destroyed by the Turks.

The ruins of Axum, of which we have given a short account, upon the authority of Bruce, in the article ABYSSINIA, have been recently examined with great attention by Lord Valentia. After much fruitless search, he was unable to find the inscription mentioned by Bruce; but was so fortunate as to discover a monument, about eight feet high, three and a half broad, and one thick, which contained a long Greek inscription. This monument seems to have been erected about the year 330, by Æizanas, king of the Axomites, in honour of his two brothers, who subdued the insurgent nation of the Bougæitæ, (perhaps the Bogenses of Edrisi.) This inscription contains an account of the hospitality shewn to the prisoners who were taken, and establishes the fact of Axum having been the capital of a people called the Axomites.

Lord Valentia measured and carefully examined all the obelisks at Axum. There are seven large ones, ornamented in the same manner as the large and beautiful one mentioned by Bruce, which is still standing, and which is 80 feet high, consisting of a single block of granite. The smallest is 36 feet, but the dimensions of the largest are considerably greater than those of the erect one.

Not far from the church, in a square inclosure surrounded with pillars, Lord Valentia found a short inscription, in Ethiopic characters, to this effect: "The Aboona David removed and broke to pieces here; he thought within himself, the Lord was pleased that he so should do." This explanation seems to account for the destruction of the temple and obelisks. These ancient monuments, originally 55 in number, are said by the priests to have been built by Ethiopus, the father of Abyssinia, about 1540 years ago.

The present town, which contains about 600 houses, stands partly in, and partly at, the mouth of a nook formed by two hills, on the north-west end of an extensive valley, where the soil, which is very productive, is interspersed with small pieces of spar and agates. Several manufactures of coarse cotton-cloth are carried on here; and excellent parchment is made of goats' skins by the monks. N. Lat. 14° 6′ 36″, E. Long. 38° 39′. See Bruce's *Travels*, vol. iii. p. 128, &c.; and Lord Valentia's *Travels*, vol. iii. p. 87, 179. (π)

AXYRIS, a genus of plants of the class Monœcia, and order Triandria. See BOTANY. (w)

AYE AYE, the name given by the inhabitants of Madagascar to a singular species of quadruped like a squirrel, discovered by Sonnerat. See Sonnerat's *Voyage to the East Indies*, tom. ii. p. 137. (w)

AYENIA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (w)

AYESHA, the wife of Mahomet. See ARABIA.

AYLESBURY, an ancient borough of England in Buckinghamshire, is situated on a branch of the Thames, in the pleasant and fertile vale of Aylesbury. It was formerly a place of considerable strength, and was taken from the Britons by the Saxons under Cuthwolf in 572. It was made a royal manor by William the Conqueror, who granted it to William of Aylesbury, under the singular tenure, that he should find straw for the king's bed-chamber three times a-year, should the king pass that way so often; and provide his table with two green geese in summer, and in winter with three eels. This town is the most considerable in the county; and, from the irregular formation of its streets and lanes, extends over a great surface of ground. It sends two members to parliament; and here are held the quarter-sessions for the county, and the Lent assizes. It contains 679 houses. The lower classes of the inhabitants are principally employed in lace-making. Population 3186. N. Lat. 51° 49′ 18″; W. Long. 0° 50′ 18″. See Britton's *Beauties of England and Wales*, vol. i. p. 343, &c. (p)

AYLESFORD, a town of England, in the county of Kent, lies on the northern bank of the river Medway, and derived its name from a bloody battle which was fought here by the Angles or Saxons under Hengist, and the Britons under Vortimer in 455, Aylesford being merely a contraction for *Anglesford*. In the neighbourhood are shewn the burying places of Horsa the brother of Hengist, and Cotigern the brother of Vortimer, who fell fighting hand to hand in this engagement. Here is a handsome stone bridge of six arches over the Medway; a hospital for six poor people, each of whom receives ten pounds a year; and the remains of a monastery of Carmelites, now converted into a mansion-house of the Earl of Aylesford. Houses 151, and population 912. N. Lat. 51° 21′; E. Long. 0° 28′. See Hasted's *Hist. of Kent.* (p)

AYLMER, or ÆLMER, JOHN, bishop of London, was descended from an ancient family, and was born at Aylmer-hall, in the county of Norfolk, in 1521. Being a younger son, and destined for the church, he was educated at Cambridge, under the patronage of the Duke of Suffolk, who, pleased with his application and early attainments, received him into his family as preceptor to his children. One of these was the amiable but unfortunate Lady Jane Grey, who, under the care of Aylmer, soon became a proficient in classical literature. By his preferment to the arch-deaconry of Stow, Aylmer had a seat in the convocation held in the first year of Queen Mary, where he resolutely opposed the return to Popery, and zealously maintained the doctrines of the Reformation. But the persecutions which followed compelled him to quit the kingdom. While abroad, he visited most of the universities on the continent; and wrote an answer to John Knox's "First Blast against the monstrous Regiment and Empire of Women," which he entitled, "An Harborowe for faithful and trewe subjects against the late bloune Blaste concerning the Government of Women, &c." Returning to England, on the accession of Elizabeth, he was presented to the arch-deaconry of Lincoln, and sat in the famous synod which was held in 1562, for reforming and settling the doctrines and discipline of the church of England. In 1576, he was raised to the see of London, in which he continued until his death, in 1594, at the age of 73. Bishop Aylmer was a bold and zealous advocate in the cause of the Reformation, and equally an enemy to the Puritans and Papists. He was most assiduous in public preaching, and performed the sacred duties of his office with a conscientious regard for the spiritual welfare of his people, and the good of the church. He was a man of considerable learning and abilities, but rather of an irritable and persecuting spirit; and his unwarrantable attacks upon the puritan clergy, and the virulent abuse with which he treated them, drew upon him a retaliation no less acrimonious; for, according to Fuller, he was the hero of the celebrated Martin Mar-Prelate. See Andrew's *Hist. of G. Britain*, vol. i. p. 524. *Biog. Brit.* (*p*)

AYR, or AIR, (anciently named *Vidogara*,) a river which rises from Glenbuck, on the boundary between Lanarkshire and Ayrshire, and, after running thirty miles westward, falls into the Firth of Clyde at the harbour of Ayr. This river divides the county into two portions not very unequal; and it is possible that the present name might originate from this very circumstance. The inland boundary of Ayrshire, as it appears in ancient maps, is incurvated almost in the form of a bow, and if the line of coast be considered as the string, the river, which bisects it and extends to the most prominent part, nearly in the direction of an arrow in a bow, might be called ARWE, on the same principle which has given the name of *sagittal* suture to the synarthrosis between the parietal bones of the cranium. This etymology, suggested by a whimsical writer, is not more unsatisfactory than many others which have been assigned to the word. The poet Jonston has no hesitation in deriving it from the purity of the atmosphere; and he awkwardly hints, that its resemblance to the Latin *Aurum*, implies some affinity to gold. Some learned persons choose to say, that the name of this river signifies *water*, others *shallow*, others *clear*, others *rapid*; not one of which terms can be admitted to form a distinction between it and the other rivers in the county. There is no doubt, that in many languages a word similar to this signifies *water*, *air*, *fire*, or some other fluid; and probably these significations are all derived from the Heb. אר, *to flow*. It is most probable that the modern *Ayr* is only the termination of the ancient name, Fiodach-Ar, or Gwddawg-Ar, (whence Vidogara was formed,) signifying the *sylvan river*, or the *river in the forest*.

For about fifteen miles from its source the river possesses no beauties. The remaining half of its course is very romantic. The banks, in most places, are precipitous and rocky, clothed with natural wood, and the dusky stream below winds its way round these steep eminences, many of which have also been decorated by modern improvements. (m. g.)

AYR, or AIR, (formerly *Are*,) a very ancient town on the west coast of Scotland, and the capital of Ayrshire, is situate on the southern bank of the river of the same name, at its influx into the Firth of Clyde. To the parish of Ayr that of Alloway was annexed early in the 18th century; but the lands granted in the charter of the borough, (most of which have long been alienated,) extended over the whole of these now united parishes. The present rental of this royalty is £10,000 per annum, and the number of acres is above 5000. Fifty years ago the state of agriculture was so wretched, that in the parish of Alloway the farmers could not afford to pay 1s. 3d. of rent per acre.

In former times this town was a place of considerable military importance. Though nature has not afforded it any remarkable facilities for defence, there is reason to believe that it was fortified at a very remote period. No trace remains of the more ancient places of strength, which are obscurely hinted at in the traditionary records of the vulgar; but it is known that in 1197, William, surnamed the Lion, built a castle at the mouth of the river. A few years afterwards, this prince, whose charters to royal boroughs are the oldest now extant, erected a borough at his *New-castle-upon-Are*. The charter, having no year affixed to it, is generally supposed to have been granted about the year 1180; but the date appears, from internal evidence, to have been twenty years later. As it contains a reference to the new castle, it must have been posterior to the year 1197; and as the first witness, Florence, archbishop of Glasgow, is designed *electo Glascuensi Cancellario meo*, it could not be earlier than 1202, the year in which that prelate was advanced to the high office of chancellor.

The borough is under the government of a provost, two bailies, a dean of guild, a treasurer, and twelve counsellors; and, along with Irvine, Rothesay, Inverary, and Campbeltown, enjoys the privilege of sending a burgess to serve in the United Parliament. Very few boroughs, either in Great Britain or Ireland, are so little embroiled with party politics, and so little under the influence of great families. The chief magistrate, and leading members of the council, have generally been men of good education, public spirit, and liberal views; and yet some of the most obvious and indispensable matters, connected with police, have been strangely overlooked.

The town can boast of few advantages in point of appearance. The houses are set down so awkwardly, and (as it were) fortuitously, that it is impossible to conceive that the former inhabitants consulted either neatness or convenience, when they produced such uncouth and amorphous combinations. Even in the principal street, the eye is hurt perpetually by observing the contiguous buildings protruding beyond each other, in almost every possible direction, one perhaps standing square to the front, another shouldering obliquely forward, and a third facing to the right or left. Here you see a stately edifice, rearing its gigantic form over a diminutive hovel, with scarcely a door or window. This circumstance is perhaps favourable to the view of the town from a distance, as the great inequality of surface produces something of a turreted appearance, and compensates for the small number of spires. This street has been compared to a crescent, but with no propriety, unless any crooked line, full of indentations, can be called a crescent. The streets are ill lighted, wretchedly paved, and very insufficiently cleaned. Side-pavements of flag-stones, for foot passengers, may be mentioned among the *desiderata*, which, in a situation like Ayr, might easily be supplied; and this very practicable improvement would surely conduce greatly to the comfort of the inhabitants.

The prison, like the old tolbooth of Edinburgh, interlines, and almost blocks up, one of the principal streets. Security is the only consideration which seems to have gained the attention of those who planned this public nuisance, which is not so much the terror of evil doers, as the horror of those that do well. The air is admitted very sparingly, and the accommodation is so inadequate, that old and young, male and female prisoners are frequently crowded into the same apartment. We are astonished that a great county like Ayrshire, should be so far behind many less populous districts, in effecting an improvement, which, more than almost any other, marks the superiority of modern civilization.

There are few public buildings worthy of particular notice. Before the Reformation there were monasteries of Dominicans and Franciscans, the former founded in 1230, and the latter in 1472. The church of St John the Baptist stood near the sea, and probably within the ramparts. Its tower still remains. Here, it is said, a parliament was held, in the time of Robert Bruce, to settle the succession to the throne of Scotland. This venerable structure continued to be the place of public worship till the middle of the 17th century, when it was converted into an armoury by Oliver Cromwell, who built a citadel round it; the stones for erecting which were almost all brought from a distance by sea, and chiefly from the castle of Ardrossan, a distance of twenty miles. The citadel encloses twelve acres of ground. Cromwell gave the town £666 : 13 : 4 sterling, to build the present church, which is capable of containing nearly 2000 persons. Another church has been recently built, which accommodates 1200.

In 1796, an academy was established here, and a handsome building erected, containing a number of spacious apartments, in which all the branches of education necessary for a commercial life are taught by able masters. The institution is superintended by a rector, who teaches experimental philosophy, astronomy, chemistry, Greek, &c. Other masters are appointed for mathematics, geography, navigation, arithmetic, Latin, French, English, writing, and drawing. The number of students last year amounted to 512. Within these few years, two rectors of this academy have been elected professors of natural philosophy in the two oldest Scotish universities. Besides this prosperous seminary, there are several other respectable schools, and in particular one or two female boarding schools.

A flourishing banking company, under the firm of Hunters and Co., has existed in Ayr for many years; and has a branch at Irvine, and another at Maybole. The Bank of Scotland has also an agent at Ayr.

The manufactures are not very considerable. Tanning and soap-boiling deserve to be mentioned.

The port was formerly considered as of no small consequence. Buchanan characterises it as "*Emporium non ignobile.*" The navigation, however, is liable to be impeded by a bar, which is occasionally thrown across the mouth of the river, especially by the N. W. winds; and the depth of water, even at spring tides, is but 12 feet. The foundation of a harbour was laid in 1772, a year memorable also for the failure of the Douglas and Heron Bank. To this port belong at present 60 vessels; from 200 tons register downwards, the whole tonnage of which amounts to between 5000 and 6000. The seamen employed are 500. The principal export is coal to Ireland, about 50,400 tons annually. The other exports are pig-iron from Muirkirk and Glenbuck, 1000 tons; coal-tar, 650 casks; brown paint, 470 casks; lamp-black, 700 barrels; coal-oil, 26 puncheons; soapers' salts, 170 tons; also *water of Ayr stone*, and black-lead; with boots, shoes, stockings, linens, cottons, wool, yarn, cheese, seeds, farming utensils, machinery, &c. The imports are hides and tallow from S. America; beef, butter, barley, beans, oats, meal, yarn, linen, feathers, kelp, bricks, quills, soap, and limestone, (about 8000 tons annually,) from Ireland; wheat, square timber, spars, and deals, from the British colonies in America; hemp, pitch, tar, iron, timber, &c. from the Baltic; slates from Easdale and Fort-William; grain and meal from Galloway; British spirits and general goods from Glasgow; oak-timber, &c. from the west of England; and general cargoes from Leith, Liverpool, London, &c.

Contiguous to the harbour, and within the precincts of Cromwell's Fort, are barracks capable of containing a battalion of infantry.

The inhabitants in general are industrious and sober; and the more opulent part of them equally distinguished for their hospitality to strangers, and in humanity to the poor. A charity-house was built in 1756; and various other means have been provided for relieving the necessities of the helpless and infirm. One expedient in particular deserves, we think, to be made known, as its beneficial effects have been extensively felt among the lower orders. Within the last twelve years, six female societies have been formed; the first of which consists of [illegible] honorary members, and 70 general members, as they are called. Every member pays six shillings annually into the funds; and every ordinary member, when unable to work, receives five shillings a week. They receive also two guineas each when they are married; half-a-guinea for every child that is born; and when they die two guineas are paid for their funeral expenses. Some of the other societies are conducted on a principle somewhat different; but all of them are under the management of ladies, and the regulations are such as tend equally to guard against imposition, and to secure immediate relief to the distressed. The number of females associated for this purpose is 645.

It has sometimes been regretted that there is no infirmary or bridewell in Ayr. The want of the former must be felt chiefly by the medical practitioners, who might, by such an establishment, be saved a great deal of inconvenience. In all cases of necessity, these gentlemen are in the habit of giving their advice and attendance gratuitously, and this with equal assiduity and tenderness.

The markets are well supplied with provisions of all sorts, particularly fish, at moderate prices. Coal is abundant and very cheap. The climate is healthy, and the society more agreeable than is generally to be met with in small towns. A public library has long been established; and, for several years there has been a printing-office, where a newspaper is published weekly. A number of neat villas and elegant houses have lately been added to the immediate vicinity; and it is to be hoped that in a short time the daily increasing beauty of the environs, will be sufficient to withdraw the attention from the prominent deformities of the ancient streets.

The population, in 1801, was stated at 5492; but none of the sailors belonging to the town were included; so that, from this and some other circumstances, the females appeared to be more numerous than the males by more than one-fourth. A greater disparity appears in many other lists; a strong presumption that the *census* alluded to was very inaccurately taken. The present number in the borough of Ayr, may be estimated at 7000; and if we add the adjoining villages of Newton and Wallacetown, which are connected with this town by two bridges, the amount can scarcely be under 11,000. This parish claims the honour of having given birth to Joannes Erigena, Chevalier Ramsay, and Robert Burns. N. Lat. 55° 27', W. Long. 4° 37'.—Distance from Edinburgh 76 miles; from Glasgow 34. (m. [illegible])

AYR, Newton-upon; a borough of regality on the north side of the river Ayr; the property of which is held by a very peculiar tenure, (described in the *Statist. Account* of *Scotl.* vol. 2.) On the confines of this small parish is an hospital, called *King-Case*, founded by Robert Bruce for eight leprous persons. The town itself is of great, though uncertain, antiquity. A number of boats are employed in fishing; and a considerable quantity of coal is exported. Some ships are built on this side of the harbour of Ayr; and for several years past a rope-work has been established. Population nearly 2000. (n. s.)

AYRSHIRE, a maritime county in the west of Scotland, bounded on the south by Wigtonshire and the stewartry of Kirkcudbright, on the east by Dumfriesshire and Lanarkshire, on the north by Renfrewshire, and on the west by the Firth of Clyde, and the Irish sea. Its length along the coast is above 80 miles; and its greatest breadth from west to east about 32 miles. It contains three districts, (formerly denominated the three bailliaries of Scotland,) Carrick, on the south of the river Doon,—Cunningham, on the north of the Irvine,—and Kyle, or Coil, which occupies the intermediate space, and which is subdivided, by the river Ayr, into King's Kyle, and Kyle Stewart. It includes the rock of Ailsa, and the two islands called Cumbraes, or Cambrays. The number of parishes within the county is 47. It is said to contain 1040 square miles, or 665,600 English acres. In 1801, the number of inhabitants was reported to the House of Commons to be 84,306. In 1755, it had been stated at 59,268, and in 1790—1798, at 75,544. The valued rent is £149,595 Scots; and in 1796, Sir John Sinclair estimated the real rent at £112,752 sterling. The following is an accurate statement of the real rental for 1808:

District of Cunningham,	£127,632	4
Kyle,	113,462	3
Carrick,	63,724	0
Royalty or parish of Ayr (in Kyle,)	9,855	0
Total,	£314,673	7

Ayrshire.

The general appearance of the county, though not remarkably variegated, cannot easily be characterised in a few words. Carrick, we think, is the most interesting, though not the most fertile district. Its coast, extending from the Doon to Loch Ryan, (which some maintain is the 'Ουιδογαρα, and others the Περιγονιος κολπος of Ptolemy,) is occasionally bold and rocky; and its southern limit is enclosed by a lofty ridge of hills, (the *Uxellum Montes*,) partly green, and partly clothed with heath. The intervening space between the shore and the mountains is, for the most part, a gradual, but not uniform, ascent. The surface is diversified by numerous acclivities, some of them gentle, others more abrupt, separated from each other by rivulets not "unknown in song," quietly stealing along verdant meadows, or pouring their foamy waters under the beetling foliage of sequestered dells, which have been successively occupied as the lurking-places of freebooting desperadoes, the retreats of unfortunate heroes, and the favourite haunts of the loves and the muses. The chief of these streams, overhung with natural wood, are the Girvan and the Stinchar, or Ardstinchar, a sound not easily adapted to the melody of verse, but still less uncouth than the names of its tributary brooks, Muick, Feoch, Ashil, and Dusk. Indeed most of the rivers in Ayrshire have names insufferably harsh and grating to the ear. With regard to Carrick, we shall only remark farther, that, though it contains many picturesque charms, many fairy landscapes, and many glens incomparably romantic, and though, from its vicinity to the ocean, it reveals some magnificent prospects, it does not possess within itself either the grandeur or the sweetness, either the richness or the gaiety, which enliven the Arcadian scenery on the Tay, the Tweed, and the Teviot.

Kyle, or Coil, having once been a forest, may have taken its name from that circumstance, (the Celtic *Coill* signifying *wood*;) but the natives, misled probably by the old chroniclers, derive it from Coilus, a British king, who is reported to have fallen in battle somewhere on the river Coil, and to have been buried either at Coylton, or at Coilsfield. If such a personage ever existed, this does not appear to have been the scene either of his actions or of his misfortunes. The hill country, towards the east, is bleak, marshy, uncultivated, and uninteresting; and on that side, except at one or two places, the district was formerly impervious. In advancing from these heights to the sea, the symptoms of fertility and the beneficial effects of cultivation, rapidly multiply; but there is no "sweet interchange of hill and valley," no sprightliness of transition, no bold and airy touches, either to surprise or delight. There is little variety, or even distinctness of outline, except where the vermiculations of the river are marked by deep fringes of wood waving over the shelvy banks, or where the long and almost rectilineal summit of the brown Carrick terminates abruptly in a rugged foreland; or where the multitudinous islands and hills beyond the sea exalt their colossal heads above the waves, and lend an exterior beauty to that heavy continuity of flatness, which, from the higher grounds of Kyle, appears to pervade nearly the whole of its surface. The slope, both here and in Cunningham, is pitted with numberless shallow depressions, which are surmounted by slender prominences, rarely swelling beyond the magnitude of hillocks, or knolls. Over this dull expanse the hand of art has spread some exquisite embellishments, which, in a great measure, atone for the native insipidity of the scene, but which might be still farther heightened by covering many of these spaces with additional woods, free from the dismal intermixture of Scotch fir, a tree which predominates infinitely too much all over the country, deforming what is beautiful, and shedding a deeper gloom on what is already more than sufficiently cheerless.

Cunningham is said by Buchanan to be a word of Danish extraction, denoting a king's habitation; and hence he infers, that the region was in possession of the Danes before it received this denomination. It is less fanciful to derive the name from the Saxon word, signifying a place where conies or rabbits burrow, an appellation which suits the district well, as its sandy downs abound with rabbit warrens to this day. This fertile tract of country is divided among a few great proprietors. It is decorated only by a small number of gentlemen's residences; but it contains several populous towns, and the harbours of Irvine, Saltcoats, and Ardrossan. With the exception of Largs, which is circumscribed within a rocky frontier, so as to be insulated from the surrounding country, almost the whole of Cunningham declines gradually towards the sea, presenting on all sides a rich and extensive prospect, finely contrasted with the islands in the Firth of Clyde, the Cumbraes, Bute, Arran, and the distant mountains of Argyleshire. When it is skilfully cultivated, it will rank with the finest plains in the whole of Scotland.

Formerly the baronies of Cunningham and Largs were under the jurisdiction of the borough of Irvine. The Earls of Cassilis were hereditary bailiffs of Carrick; the Campbells of Loudon were hereditary bailiffs of Kyle; and the Wallaces, lords of Craigie, were heritable stewards.

There are many lakes in this county, some of them extensive, but none very remarkable either for the beauty or the wildness of the scenery. The shore in general is very flat, and kelp is found in various places; but little attention has hitherto been paid to the manufacture of this valuable substance.

With respect to the climate, it is observable that there is much more rain in general on the western than on the eastern coast of Scotland, and particularly in the autumnal and winter months. In the spring, however, the west has the advantage. The easterly winds are not by any means so hurtful to vegetation, or so intolerably chilly in that part of the island, as they are in the vicinity of the German Ocean; and the uncomfortable fogs, which prevail so frequently on the Firth of Forth, are comparatively little known in Ayrshire.

There is considerable diversity of soil in this county. Near the shore it is for the most part sandy, but in many places intermixed with a rich loam. In other places gravelly soils prevail; but not to a very great extent. A large proportion of the soil is a stiff deep clay, which produces very abundant crops, when carefully managed. In some situations, the clay is merely superficial, lying over a substratum of schistus or till. Towards the east, where the grounds are highest, there is a great predominance of fen and peat-moss.

Till of late years the state of agriculture in Ayrshire is described as having been barbarous in the extreme. A most deplorable picture is drawn by Col. Fullarton of the wretchedness, ignorance, and apathy, in which the farmers were sunk till the middle of the last century; and it appears that it required no ordinary efforts to emancipate them from the degradation to which they had long been doomed, not by the rigour of their superiors, but by their own prejudices. We lament to state, that the means which were thought necessary to rouse them from their torpor, have tended to retard rather than to accelerate the progress of good husbandry. With a view to enforce the observance of an improved system, Mr Fairly of Fairly recommended a plan, which has been almost universally adopted, of granting leases with the most rigid restrictive articles, prescribing a particular course of operations to be followed in the management of every farm, under the penalty of heavy additional rents to be imposed for every deviation however slight. According to his scheme, every farm is divided into three parts, and the tenant is bound not to plough more than a third in any one year, and not to plough the same land more than three years successively. The series of crops is also specified. By these regulations, all the land must rest six years in grass before it can be ploughed a second time. In some places only a fourth of the land is permitted to be in tillage at a time, and only two successive crops are allowed to be taken. The leases are generally granted for 15 or 18 years.

So long as this practice continues, there can be little encouragement to intelligent farmers to embark in an undertaking, in the course of which they must often be constrained to act in opposition to their own judgment. There is no scope left to the exertion of ingenuity, and the most obvious improvements are interdicted by an authority equally arbitrary and injudicious. It is absolutely impracticable to devise a mode of cultivation which will be applicable to every variety of soil; and we can scarcely conceive any system less adapted than this to the clayey soils, which cannot be meliorated without frequent renovation by the plough.

The improvements in agriculture are consequently found to be much fewer than might have been expected, if a more liberal system had been pursued by the landed proprietors. The land is neither sufficiently drained nor cleaned. Many of the antient clumsy practices are still in use. Four horses may be seen dragging an old fashioned plough; or more frequently three horses, with a driver. We have, in several instances, (as lately as April 1810,) witnessed the phenomenon of a plough drawn by two horses, and managed by two men, one holding and another driving. We will not venture to divine what can be the pretence for employing these supernumeraries. On many of the lands, the ridges are still high, broad and crooked, and the furrows filled with a profusion of rushes. In the neighbourhood of some of the populous towns a better system prevails. The most approved alternate husbandry has been partially introduced, and the lands are let at high rents. Small inclosures sometimes draw from £8 to £10 per acre. The more general rent for arable farms in favourable situations, is at the rate of £2 or £3 per acre. The great abundance of lime is an advantage which is possessed by this county more than almost any other.

Considerable attention has long been bestowed on the rearing of cattle. In Carrick, the Galloway breed has long been esteemed the best for fattening easily, and the beef is allowed to be superior to that of most other species. In Cunningham and Kyle, the Dunlop breed is preferred, as yielding the best milk. The cheese called Dunlop, originally introduced in the parish of that name, is in great repute, and bears a high price throughout all Scotland. The hills in Carrick, and part of Kyle, afford excellent sheep pasture; and great pains have been taken to improve the breed. In ancient times the sheep of Carrick were celebrated for the fineness and whiteness of their wool. The cultivation indeed appears to have been better formerly than of late. Ayrshire, three centuries ago, was one of the few counties that produced wheat and whisky.

We cannot bestow great praise on the mode in which the land is inclosed and subdivided. With regard to planting, though much has been done, we have already expressed our regret, that there should be such a predilection in favour of the Scotch fir, a species of wood neither pleasing nor profitable, the predominance of which tends to deform many fine tracts of country, which it was intended to beautify as well as to shelter. We may here observe also, that the roads in general are by no means good: they are too narrow, and often carried along the very worst lines; but what is still more inexcusable is, that, though the materials are every where found in great plenty, the roads are kept in very bad repair.

The most important minerals found in Ayrshire, are, 1. Coal, which abounds in almost every parish, and which is wrought in vast quantities in the vicinity of all the towns, especially near the coast. The quantity exported exceeds 100,000 tons annually. 2. Limestone and marl also abound,—the former, however, in the greatest number of places. A considerable quantity is likewise brought as ballast from Ireland. 3. Iron-stone is found in different parts of Carrick, and in the higher parts of Kyle towards the source of the Ayr. At Glenbuck, more than 2000 tons of pig iron are made annually; and a much greater quantity at Muirkirk. 4. Free-stone is also found in many places throughout the county. 5. Lead has been discovered in considerable quantity, and mines were opened several years ago in the parish of New Cumnock. The other minerals are copper ores, plumbago, barytes, crystals of zeolite, gypsum, agates, and what is called *water of Ayr stone*, which is in high estimation among cutlers.

The principal towns in Ayrshire, are the boroughs of Ayr and Irvine,—Kilmarnock, Saltcoats, Stewarton, Catrine, Mauchline, Muirkirk, Maybole, Girvan, Beith, Kilwinning, Ballantrae, &c.

Irvine and Saltcoats, though eight miles distant, are considered as the same port. The number of vessels is 90; the tonnage 6774; the seamen 507. The coal exported amounts at an average to 42,000 tons. The imports are almost every species of Irish produce, particularly about 10,000 quarters of grain yearly. The chief foreign import is timber from America, since the Baltic trade has not been regularly open. The trade of Saltcoats is about one-third of the whole. The population of Irvine is about 5000; that of Saltcoats about 3000.

Kilmarnock, the largest town in Cunningham, has long carried on manufactures of carpets, woollen cloths, leather, shoes, and gloves, to a great extent. The annual amount is not less than £100,000. The population is about 10,000. An academy has been lately formed here, which is attended by nearly 400 young people. At Catrine, 15 miles up the river Ayr, very extensive cotton-works were erected some years ago by Mr Alexander of Ballamyle, and Mr Dale of Glasgow. The population is between 2000 and 3000. The process of weaving is carried on in some of these works by the steam engine; and spinning is executed by water machinery.

Girvan is a small sea-port, the trade of which is very inconsiderable. Stewarton was formerly engaged chiefly in the manufacture of bonnets; and Kilwinning deserves to be mentioned as the birthplace, or rather the nursery, of free-masonry in Scotland.

In the neighbourhood of Muirkirk, there are two sets of iron-works, and also manufactures of coal tar, lamp black, brown paint, &c. Among the improvements which have been projected of late years, there are two which claim particular notice, the canal and harbour of Ardrossan, and the harbour of the Troon, with a rail-road from Kilmarnock, &c.

The bay of Ardrossan, to the north of the port of Saltcoats, is formed by nature, (Mr Telford has remarked in his Report,) as a complete harbour for all the purposes of safety. It possesses many peculiar advantages for communication with Ireland and America, as well as the Baltic; and the canal might be expected to place it in the same situation with respect to Glasgow, which Liverpool holds in relation to Manchester. Mr Telford's proposal was, to convert a space of 300 yards in length, and 100 yards in breadth, into a wet dock, to hold 16 feet depth of water; the length of the south pier to be 600 yards, and that of the north pier 350 yards; the wet dock to contain from 70 to 100 vessels; and the canal to enter at the north-east extremity. The expense of the harbour was estimated at £40,000. The south wall is now finished. Few tide-harbours possess equal advantages, in point of outlet to the sea, facility of entrance, conveniency for anchoring, and security to shipping. But it cannot be expected, that the trade of Glasgow will soon come into this harbour, much less that any other trade, to the extent calculated, is likely to open. The new village of Ardrossan possesses excellent baths, and promises to become one of the best watering places in Scotland.

The Troon Point, between Ayr and Irvine, is one of the finest natural harbours on the west coast, and was long found a convenient station for the smuggling trade. About the beginning of the last century, it is said that the merchants of Glasgow applied to the then proprietor for a feu of the lands adjacent to this spot; but the offer was rejected, from a dread that the price of provisions would be raised by the increase of population, in the event of a harbour being erected. The present Duke of Portland, actuated by more enlightened views, has lately obtained two acts of parliament, the one for forming a harbour at the Troon, and the other for making a railway from the Troon to Kilmarnock. A new pier is constructing, which is to extend from the rock, nearly at right angles, to the distance of 800 feet, where the depth is 19 feet at low water. In the course of this year (1810) 300 feet will be completed. The railroad is advancing rapidly; and it is now proposed that a branch of it shall communicate with Irvine.

Throughout every part of Ayrshire many vestiges of antiquity may be traced, as cairns, encampments, druidical circles, &c. The castles at one time must have been very numerous. The remains of a few are still visible, as of Loch Doon, Denure, Greenan, Mauchline, Turnberry, Auchinleck, Barr, Dean, Dundonald, Cessnock, Kirrila, Knock, Fairly, Skelmurly, Barbiston, Sundrum, Cumnock, Ardrossan, Cassilis, Thomaston, &c. There were also many religious houses, as—the abbey of Kilwinning, founded in 1140; Crossraguel, in 1244; Failefurd, a monastery, in 1252; Feale, a priory; Mauchlin, an abbacy, founded by David I.; Dalmulin, a monastery, founded by Walter II. Steward of Scotland; Ayr 1230, and another 1472; Irvine, 1412; Minniboil, (Maybole), a collegiate church, in 1441; Kilmaurs, in 1403, &c.

The most ancient families in this county are said to have been Auchinlecks, Blairs, Boyds, Boswells, Campbells, Cathearts, Cochranes, Craufurds, Crichtons, Cunninghams, Dalrymples, Dunlops, Fullartons, Hamiltons, Kennedys, Lindsays, Montgomeries, Stuarts, Wallaces.

Few parts of the country have undergone greater vicissitudes than this. With regard to the aborigines, it can scarcely be doubted, that the Selgovæ, Novantes, and Damnii, who, at the time of the Roman invasion, possessed the peninsula between the Solway and the Clyde, were of British descent. These tribes formed part of the province of Valentia, which submitted to the yoke of the conquerors, while the Caledonians, to the north of Antoninus' wall, maintained their independence. The Damnii appear to have inhabited Ayrshire, or at least the northern part of it, although the whole tract of country, including ancient Galloway, Carrick, Kyle, and Cunningham, has sometimes been called the Chersonesus of the Novantes. After the abdication of the Roman government, this territory is described as an independent principality, known by the name of the Cambrian, or Cumbrian kingdom, sometimes less correctly denominated the kingdom of Stathcluyd. During the Saxon heptarchy, Galloway, including the southern division of Ayrshire, was infested and over-run by the Northumbrians; and to this period we may perhaps refer the origin of certain Saxon names and usages, as well as some superstitious notions, which are scarcely yet eradicated, and which are evidently relics of the Anglo-Saxon mythology. Thus Kirkoswald, in Carrick, according to tradition, owes its name to Prince Oswald, to whom, also, Kirkoswald in Northumberland traces its foundation; and at both places certain customs are still prevalent, which must be ascribed to one common source. The elfin race, who have so long haunted the banks of the Girvan and the Garpal, and who, to this hour, are said to be performing their capricious freaks in the precincts of Crossraguel's ruined abbey, are well known to be of Saxon pedigree. In the eighth century, the Saxons extended their ravages to Kyle and Cunningham, and established a colony in that province. These intruders, aided by the Picts, reduced the metropolitan city of Alcluyd, and enjoyed a short-lived tranquillity in their usurped possessions. The Scots of Ireland and Argyle did not permit them long to rest. Early in the ninth century, the sanguinary and rapacious Alpin sailed from Cantire, and made an unexpected descent on the coast of Kyle. His savage followers spread devastation every where around; but his progress was suddenly checked by some of the native warriors; and the invader fell, at a spot near the source of the Doon, afterwards distinguished by the name of Laicht-Alpin, where, as the etymology suggests, a flat and ponderous stone was placed to mark his grave. Kenneth Mac-Alpin was more successful in his incursions on the western shores; but though his forces effected settlements in these regions, and though emigra from Ireland, at different periods, colonised spacious portions of the same territory, and gave the name of Galloway to the whole extent of country from the south of Annandale to the north of Ayrshire, it is not ascertained that the Saxons were either exterminated or altogether dislodged: On the contrary, there can be little doubt, that many of the present inhabitants of Ayrshire are of Saxon extraction, and that the numbers of that lineage were reinforced by the crowds of English refugees who fled from the sword of the Norman conqueror, during the reign of Malcolm Canmore. The promiscuous race of Britons, Saxons, Scots, and Picts, who occupied this part of the country, were frequently infested by the Danes, or Norwegians; and tradition still points out the traces of many hard fought battles, in which the invaders were discomfited with immense slaughter. The last and fiercest of these encounters is said to have taken place at Largs, in 1263, when the host of Norway was routed by the Scots; but the glories of that bloody day have been prodigiously exaggerated by our national chroniclers. A more obstinate foe from the south afterwards made encroachments on this devoted province, which was kept in perpetual agitation and alarm, during the alternate successes and reverses of Wallace and Bruce. The English kept possession of the strong fortresses long after the whole of Ayrshire had been steadily devoted to the cause of Bruce, the earl of Carrick. After the fatal battle of Durham, (1346,) the victorious troops of England again penetrated into the heart of this county, carrying devastation and terror wherever they went. During the next 200 years, the hostile visits of our southern neighbours seldom reached so far; but this part of the land was sufficiently harassed with domestic turbulence. While the feuds of rival chieftains were reducing the population, superstition was erecting her gloomy temples, and ecclesiastical authority was boldly appropriating the inheritances of the destroyers and the destroyed. The improvement of the people was little consulted by the inmates of these consecrated edifices, reared with the price of blood, and supported by the oblations of guilt; and yet, it must be confessed, that the arts which the churchmen introduced, and the efforts which they made to embellish and fructify the country, had a tendency to open the minds, and polish the manners, not only of the great, but even of the middle and lower orders. At a later period, some of the chief families of Ayrshire acted a conspicuous part in forwarding the Reformation: an undertaking in which none engaged with greater keenness than those who had the best opportunities of witnessing the haughtiness and luxury of the Catholic clergy, and those who had the fairest prospect of succeeding to a share of the opulence which they had envied, and the power which they had feared. In Ayrshire, the revenues of some of the abbeys were prodigious; and the dissolute manners of the ecclesiastics kept pace with their enormous wealth and patronage. The antipathy to this spiritual despotism continued, during the succeeding age, to operate with unabated force, all over the west. The severe and impolitic measures which were taken, soon after the Reformation, with a view to extinguish the presbyterian spirit, were such as could not fail to impress the non-conformists with a rooted abhorrence to the principles of their persecutors, and to alienate them for ever from the house of Stuart. While the toleration which they had experienced from the usurper Cromwell, whose victorious armies had quietly occupied their coasts, was still fresh in their recollection, an armed banditti from the Highlands were let loose, by the unenlightened agents of the monarchy, to suppress conventicles, and enforce uniformity of religion. This barbarous militia, regardless equally of the dictates of humanity and piety, committed unheard of atrocities; and the loss sustained in this county from their depredations, amounted, in the year 1678, to £137,500 Scots. Since the Revolution in 1688, the inhabitants have been tranquil and loyal in the most turbulent times.

The yeomanry and peasantry are, in general, a handsome, athletic, and industrious set of people, correct in their morals, frugal in their habits, and zealously attached to the civil and ecclesiastical constitution of the country. The manufacturing towns are inhabited by persons of a more miscellaneous description. The patrician families, many of whom claim alliance with the most illustrious names in Scottish history, evince a strong partiality to the county with which they are connected, and are said to be tenacious of aristocratical ideas, to a greater degree than almost any of the other nobility in the lowlands. Hitherto the middle and lower ranks have rarely been betrayed into the sectarian spirit which pervades some other counties. Of late years, indeed, the number of dissenters has increased considerably in the populous towns and villages; but their separation from the church is attended by no violent symptoms of disaffection. Their pastors, so far as we have an opportunity of knowing, are men of liberal and rational views, untainted with bigotry, and, in promoting every pious and benevolent purpose, cordially disposed to co-operate with their brethren of the established church; whose respectability and diligence are such, that the great mass of the population adhere to their ministry from affection as well as from principle.

In former times there was much smuggling on this coast; and those who engaged in it carried on their operations in such formidable bodies, that a military force durst scarcely venture to attack them with an equality of numbers. The dissolution of morals, fostered by this illicit traffic, was here confined within a limited range; but it is happy for the country that these adventurers are now almost extinct.

The above account has been necessarily abridged. We have received several interesting communications on the subject, of which our limits do not permit us to avail ourselves. No agricultural survey of the county has hitherto been printed, except one by Colonel Fullarton in 1793. It is understood, that Mr Aiton, writer in Strathaven, is employed in preparing a report on this and some other counties. Some information, though none of a later date than 1800, may also be expected from the third volume of Chalmers' *Caledonia*, (not yet published.) See CATRINE, IRVINE, KILMARNOCK, MUIRKIRK, SALTCOATS, and TROON. (m. s.)

AZAB, the *Saba* of the ancients, a territory in Abyssinia, situated on the east coast of the Red Sea, which was probably one of the principal stations of the caravans that traded to Arabia. The inhabitants were formerly called Sabæi, and it was famous for frankincense, myrrh, and aromatic plants. Near Azab are the remains of an aqueduct, built with huge blocks of marble, kept together with bars of brass instead of cement, and also of a number of walls constructed with pieces of marble in a similar manner. Azab was probably the residence of the queen of Saba. See *Strabo*, lib. xvi.; *Diod.* lib. iii.; and Bruce's *Travels*. (*j*)

AZALEA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

AZIMUNTINES, the inhabitants of Azimus, or Azimuntum, a city of Thrace. See Gibbon's *Hist.* chap. xxxiv. vol. vi. p. 54.; chap. xlvi. vol. viii. p. 183. (*w*)

AZIMUTH, in Astronomy, an Arabic word, employed by astronomers to denote the arc of the horizon intercepted between the meridian and a vertical circle passing through the celestial body whose azimuth is measured.

Let it be required to find the sun's azimuth at Greenwich, the sun's declination being 21° 40′, and his altitude 48° 20′. We have

Complement of latitude	38° 32′
Complement of altitude	41 40
Complement of declination	68 20
Sum	148 32
Half sum	74 16
Complement of latitude, subtract	38 32
First difference	35 44

Half sum	74° 16′
Complement of altitude, subtract	41 40
Second difference	32 36

Then,

Co. arith. of sine of co. lat.	38° 32′	0.2055330
Co. arith. of sine of co. alt.	41 40	0.1773117
Sine of first difference,	35 44	9.7664229
Sine of second difference	32 36	9.7314040
Sum of the logarithms		19.8806716

Sine of the half sum is 60° 39′ 9.9403358. Double of this is 121° 18′, the sun's azimuth from the north, the complement of which to 180° is 58° 42′, the sun's azimuth from the south. (Q)

AZINCOURT. See Agincourt.

AZOF, a town and fortress in Cuban Tartary, belonging to Russia. It is situated on the southern shore, and near the mouth of the river Don; and is supposed to be the same with the ancient Tana. This town, according to Strabo, was built by the Bosparanian Greeks, and was considered a place of great trade; but little is known of its history till 1474, when we find it in possession of the Genoese, who soon after resigned it to the Turks. During the succeeding wars between the Turks and Russians, Azof was alternately lost and won by these powers, till, by the treaty of Belgrade, it was agreed that the fortifications should be demolished, and the town remain subject to Russia. In this state it continued for 30 years; when, in the last wars with the Turks, the fortifications were rebuilt by the order of Catharine II. and this town is now in the best possible state of defence. Its consequence, however, as a port of trade, has been of late rapidly declining; and the arm of the Don, on which it lies, is gradually filling with sand. Population 3800. N. Lat. 47°, E. Long. 39° 14′. (p)

AZOF, Sea of, known also by the name of the Zabache Sea, lies in the dominions of Russia, and communicates with the Euxine by the straits of Caffa. Its principal harbour is Taganrok, which carries on a considerable trade with the Crimea, and the maritime towns of Natolia. The whole of the northern coast is laid out in fisheries. The fish, in general, are small, but so abundant, that 60,000 are often taken at one draught. A remarkable circumstance, of the emersion of an island in the sea of Azof, has been lately announced by M. Pallas, the celebrated naturalist. On the 5th of September 1799, this island suddenly made its appearance, at the distance of 150 fathoms from the shore. The phenomenon was preceded by a noise like thunder, and accompanied with an eruption of smoke and flames, the explosion of which resembled the discharge of heavy ordnance; at the same time, a violent shock of an earthquake was felt from Cuban as far as Catrinodan. The sea of Azof is 210 miles in length, and from 40 to 60 in breadth. N. Lat. 45° 20′ to 47° 20′, E. Long. 34° 30′ to 39° 30′. See Tooke's *View of the Russian Empire*. (p)

AZORES, Terceras, or Western Isles, are a group of islands lying in the Atlantic Ocean, about 800 miles west of Cape St Vincent, and almost at an equal distance from Europe, Africa, and America. They are discovered from a great distance at sea, on account of a high mountain, called the Peak, or Pico, in an island of the same name, and which Mr Pinkerton strongly recommends to geographers to assume as a first meridian of longitude. The Azores are nine in number, Tercera, St Michael, Santa Maria, Gratiosa, St George, Fayal, Pico, Flores, and Corvo, of which the two last are very small, and lie at a considerable distance from the rest. Concerning the history of these islands, little is known with certainty. Their discovery has been claimed by the Portuguese, though the precise period has not been determined. It has, however, been maintained, that they were first visited by Joshua Vanderberg, a merchant of Bruges, who, when on a voyage to Lisbon in 1439, having been driven from his course in a violent storm, fell in with the Azores, and called them "The Flamingas," or Flemish Islands. Communicating the intelligence to his friends at Lisbon, he gave such an account of his adventure, as induced the Portuguese, who were then the most enterprising nation in Europe, to attempt a farther discovery. Having successively explored the different islands, Don Henry, prince of Portugal, was so pleased with the acquisition, that he went in person to take possession of them in 1449. In 1466, Alphonso V. gave them to his sister the Duchess of Burgundy, when some of them were colonized by Germans and Flemings. These, however, seem always to have acknowledged the authority of Portugal. At present a Portuguese governor resides at Angra, the chief city of Tercera. In spiritual affairs they are under the jurisdiction of the bishop of the Azores, whose capital residence is in the island of St Michael.

The Azores have frequently suffered severely from earthquakes and volcanic eruptions; and from the geological history of these islands, it would appear that some of them must have owed their origin to these terrible convulsions of the earth. Kircher affirms, that in 1538 frequent earthquakes were felt for nearly eight days, which were so violent as to compel the inhabitants to forsake their houses, and lie night and day in the open fields. On the 26th June, a fire burst through the surface of the sea, flaming to the clouds, vomiting prodigious quantities of sand, earth, stones, and minerals; and raging with such fury, that, had not the wind blown from the land, the whole of the neighbouring island would have been destroyed.

This was followed by the emersion of a group of rocks, which at first filled a space of only five or six acres, but which soon extended to as many miles. Another shock of an earthquake broke them in pieces, and then united them into a solid mass, which now forms one of the small islands that lie on the north-west of the Azores. See Kircher's *Mundus Subterraneus*, lib. iii.

In 1720, another island, all fire and smoke, which roared like thunder, appeared between St Michaels and Tercera, on the night of the 20th November. The bursting out of the flames was attended by an earthquake, which shattered many of the houses in Tercera; and, for many leagues round the island, astonishing quantities of pumice stone, and half-broiled fish, were found floating on the sea: (*Phil. Trans.* vol. xxxii. p. 100.) This island, however, has since disappeared. The consequence of another furious earthquake, which occurred July 9. 1757, and which shook the neighbouring islands to their foundation, and covered them with ruins, was the production of eighteen small islands about ten yards from the north coast of St George's, which, however, subsided again in a few months.

On the 1st of May 1808, a new volcano made its appearance in the island of St George. The fire burst out in a ditch in the midst of fertile pastures, three leagues south-east of Vellas, and immediately formed a crater in size about 24 acres. It raged with great fury for two days, and the cinders which it threw up, being propelled by a strong north-east wind, covered the ground from one to four feet in depth for half a league in breadth, and three leagues in length, and then passing the channel about five leagues wide, were driven upon the east point of Pico. The fire had nearly subsided in the evening of the 2d, when a smaller crater opened, a league nearer Vellas. Its mouth was only about 50 yards in circumference. The fire seemed struggling for vent; and the force with which a pale blue flame issued forth, resembled a powerful steam-engine multiplied a hundred fold. The whole island was convulsed; earthquakes were frequent, and horrid bellowings were occasionally heard from the bowels of the earth. This was followed by 12 or 15 small volcanoes which broke out in the neighbouring field, but they all subsided on the 11th, when the large volcano, which had lain dormant for nine days, burst forth with more tremendous force, and continued to rage until the 5th of June, when it began to fail, and a few days after it entirely ceased. * Its horrid belchings were distinctly heard at 12 leagues distance, and the immense quantity of lava which it vomited, overwhelmed in its course farms, cattle, corn-fields, and vineyards; and swept the town of Ursulina from its foundation. Though it gave timely notice of its approach, many of the inhabitants, by remaining too long in its vicinity, endeavouring to save their effects, were so dreadfully scalded by flashes of steam (which without injuring their clothes took off not only their skin, but their very flesh), that several of them died upon the spot. About sixty suffered in this miserable manner; and so great was the anxiety and consternation which seized upon the people, that they entirely abandoned their domestic concerns, and were in danger of starving in the midst of plenty. This island, heretofore rich in cattle, corn, and wine, is nearly ruined; and a scene of greater desolation and distress has seldom been witnessed in any country. See the *Christian Observer*, vol. vii. p. 743.

The Azores are subject also to violent winds, and frequent inundations of the ocean, which often overwhelm the houses, and sweep from the fields the flocks and grain. They are, however, extremely fertile, and produce corn, wine, and fruits, in great abundance. There is an annual exportation of 20,000 pipes of wine; and the single article of tobacco affords a considerable revenue to the king of Portugal, who claims a tenth of all the productions of these islands. The air is wholesome, and the sky is in general clear and serene. No poisonous or noxious animals breed on the Azores, and, it is said, that if carried thither, they will expire in a few hours. N. Lat. 36° to 40°, W. Long. 25° to 33°. See Adanson *Voyage au Senegal.* Pinkerton's *Geography,* vol. i. p. 601. (*p*)

AZOTE, or NITROGEN, the *phlogisticated air* of Priestley, was discovered by Dr Rutherford in 1772. It constitutes 4-5ths of atmospherical air, the other 5th being oxygen. See CHEMISTRY. (*j*)

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* The elevation of the crater is about 3500 feet, and its distance from the sea about four miles.

B.

BAAL, or BEL, a word of Hebrew origin, denoting *ruler*, was the name by which several of the eastern nations worshipped the solar fire, which they supposed to be the governing principle of the universe. At first, indeed, this appellation seems to have been given to JEHOVAH. But as idolatry began to prevail, and the supremacy of the true God to be forgotten, his attributes were ascribed to those objects in nature whose appearance was most splendid and overpowering, or whose influence was most sensibly felt. The sun, accordingly, became an object of general adoration, and was supposed to hold the highest rank among those divinities with which the wild imaginations of eastern idolators had peopled the heavens. The author of the Phenician theology, which has been preserved in the writings of Eusebius, informs us, "that the Phenicians supposed the sun to be the only Lord of heaven, styling him *Beelsamen*, which, in their language, signifies *Lord of heaven*." A *beeve* or *bull* was the emblem of this divinity; and as this idol was represented in different places with various insignia, hence arose the denominations, Baal-berith, Baal-gad, Baal-moloch; and these diversified *Baals*, says Parkhurst, seem to be what the Scriptures call in the plural *Baalim*. There can be no doubt, however, that the appellation Baal was not always restricted to the sun, but was frequently given to those distinguished personages, who, in different nations, were exalted for their achievements to the rank of deities. Among the Phenicians, in particular, there were several divinities besides the sun honoured with this name. BAAL, BEL, or BELUS, was the principal god of the Carthaginians, Sidonians, Babylonians, and Assyrians; and as he was supposed to delight in human sacrifices, he was probably the same as the Moloch of the Ammonites, the Κρονος (*Chronus*) of the Greeks, and the Saturn of the Latins.

High places were always chosen for the temples and altars of Baal, in which was preserved a perpetual fire. His priests and prophets were extremely numerous; and the manner in which they conducted the worship of their god was at once frantic and ferocious. While the victims smoked on the altar, they danced around it with the most violent gesticulations, cut their bodies with knives and lancets, and raved and prophesied as if immediately under the inspiration of Baal. Bel, Bal, or Beal, was likewise the name of the principal deity of the ancient Irish, derived, according to Vallancy, from the Punic mythology. On the tops of many hills in Scotland there are heaps of stones called, by the vulgar, Bel's Cairns, where it is supposed sacrifices were offered by our Pagan ancestors. See Eusebius, *Preparat. Evang.* lib. 1. cap. 10. 2 *Kings* xxiii. 5. *Collectanea de Rebus Hibernicis*, vol. 2. p. 263. And Parkhurst's *Lexicon*, [illegible] (*u*)

BAALBEC. See BALBEC.

BABAHOYA, the name of a town and district of Guayaquil, in South America. Rice, cotton, Guinea pepper, and a variety of fruits, are among the productions of this district. (*j*)

BABEL, a tower, built by the posterity of Noah after the flood; remarkable for its great height, and for the disappointment of the builders, by the confusion of their language, (*Gen.* xi. 1—9.) The land of Shinar, in which the posterity of Noah settled, lay along the river Tigris, from the mountains of Armenia to the junction of the Tigris and Euphrates; and *the plain of Shinar*, where the tower was built, was undoubtedly the place, or near to the place, where the famous city Babylon afterwards stood; upon the banks of the great river Euphrates, and not far from its junction with the Tigris. Josephus, and some others, ascribe this great design to Nimrod; but, although it might correspond very well with the character which Scripture has given of that enterprising prince, yet Bochart (in his *Phaleg.* lib. i. cap. 10.) has shewn, that Nimrod was either not born, or was very young, when this tower was built. But there is no doubt, that Nimrod and his subjects did afterwards settle at Babel, and there built Babylon, which became the capital of the Assyrian empire. It has also been a common opinion, that Shem and his posterity had no hand in this great undertaking; but, from the Mosaic history, it seems perfectly clear, that the whole human race were actually engaged in it. Its date is differently computed, according as chronologers follow the LXX interpreters, who make it 531; the Samaritan copy, which makes it 396; or the Hebrew, which allows it to be no more than 101 years after the flood. It is believed to have been about the time of the birth of Peleg; for in Gen. x. 25. we read, that "unto Eber were born two sons, and the name of the one was Peleg;" which being derived from a Hebrew word signifying to *divide*, the reason why that name was given to him is added, "for in his days was the earth divided." From the account given of Peleg's ancestors, in the subsequent chapter, it appears, that he was born in the 101st year after the flood; though the confusion of the language of the builders, and their consequent dispersion, might not take place for many years afterwards.

Its dimensions, as given by ancient historians, may be deemed suitable for a building, which seems to have been designed to be the palace, or citadel, of the empire of the world. The Scripture tells us, that it was built of burnt bricks instead of stone, and of slime instead of mortar. According to an ancient tradition, three years were employed in making the bricks; each of which was thirteen cubits long, ten broad, and five thick; and they were cemented by bitumen, or a pitchy substance, of which, according to Herodotus, great quantities are to be found on the banks of the river Is, in the neighbourhood of Babylon. When some eastern writers tell us, that this tower was no less than twelve miles high, the assertion refutes itself. Even the affirmation of St Jerome, (though he rests it upon the testimony, as he says, of eye-witnesses,) that its ruins were four miles high, is as little worthy of credit. If the opinion of the learned Bochart be correct, that the tower in the temple of Belus in Babylon is the same with the tower of Babel, the description which Herodotus has given of the former, is applicable to the latter. He tells us, that it was a square tower, built in the form of a pyramid; each side of which, at its base, measured a furlong: and its height, according to Strabo, was also a furlong, or 660 feet; exceeding, by 60 feet, the highest of the pyramids of Egypt, according to the late measurement of these stupenduous monuments of antiquity by the French. Around the outside of the building, there was a winding passage from the bottom to the top, and so very broad as to permit carriages to pass each other; which gave it the appearance of eight square towers, built one above another, and gradually decreasing in size to the top of the building. It contained many large rooms, with arched roofs supported by pillars; these became parts of the temple of Belus, after it was converted into a place of idolatrous worship; and, in the highest tower, there was an observatory for astronomical purposes, a science in which the Babylonians eminently excelled.

Several descriptions of the state of this famous tower in later times, may be found in the *Anc. Un. Hist.* vol. i. p. 334. A traveller, who saw it not many years ago, describes it in these words: "Four gentlemen of our party and myself went to view the tower of Nimrod. After travelling through exceedingly high reeds and rushes, and a very dangerous road, in about two hours we came to the tower, which is built on an eminence, and a base of about 100 cubits diameter. It appears almost like a mass of earth, being erected of bricks dried by the sun, amazingly thick, and betwixt every three or four feet there is a layer of reeds; its height is at least 160 feet, but we found no remains either of a door or stairs. The only curiosity, which struck us, was the astonishing freshness of the reeds, which seemed as if put in but a very few years ago, though, by the best accounts we could find, it has been built upwards of 4000 years." *Journey from Bassora to Bagdad by a Gentleman in* 1779, p. 59.

Various have been the conjectures respecting the reason which induced the whole human race to unite, as one man, in this great enterprise. Some have supposed, that their design was to raise a tower so high as to enable them to climb up into heaven; a strange opinion, founded upon a literal interpretation of these words in Scripture, "Let us build a city, and a tower whose top may reach unto heaven;" an expression evidently intended to signify no more than that its height was to be uncommonly great. Similar expressions are to be found in Deut. i. 28. and ix. 1. where the cities of the heathen nations, who inhabited the land of Canaan, are described as "great, and walled or fenced up to heaven." Nor was it uncommon for the Greek poets to use the expressions, "high as heaven," or "reaching to the sun," when they wished to describe things of an extraordinary height. Josephus, and some others, have thought that it must have been designed to preserve them from a second deluge, which they greatly dreaded: but, had that been the case, they would have betaken themselves to the mountains, and not made choice of the low country, for building a place of security. A third opinion is, that, as the tower was in the form of a pyramid, to the figure of which the flame of fire bears a resemblance, it was a monument designed in honour of the sun, to whose influence they ascribed the drying up of the flood. But there is no foundation in Scripture for that conjecture, and the date of that species of idolatry was probably not so early as it supposes. The reason assigned in Scripture is, "Let us make us a name, lest we be scattered abroad upon the face of the whole earth." The most probable conjecture, therefore, seems to be, that, as they were now in a vast plain, undefined by buildings, or roads, or any distinct boundaries; and as they must soon separate to attend to their flocks, or go in quest of provisions; or, perhaps, dreading a dispersion, in consequence of Noah's projected division of the earth among his posterity;—they built this tower, as a *pharos*, or landmark, to enable them to find their way back to the surrounding city; which, with its immense tower, they believed would be a lasting monument of their fame, and transmit their name with honour to posterity. In that view, their design had been to make the whole world one kingdom, and Babel its metropolis.

This interpretation seems also to account for the reason of the divine frustration of their great design, and of their consequent dispersion. It is given in these words, "Behold the people is one, and they have all one language, and this they begin to do, and now nothing will be restrained from them which they have imagined to do," that is, not as some have explained the words, if this scheme shall succeed, the divine plan for the government of the world will be frustrated; but, as the words more naturally signify, this their first attempt, and if they succeed in it, they will think themselves able for any undertaking, —no enterprise will appear too great for them. Accordingly, the very dispersion which they dreaded, they brought upon themselves, by their vain attempt to avoid it. "The name of it was called *Babel*, because the Lord did there confound the language of all the earth, and from thence did the Lord scatter them abroad upon the face of all the earth." See *Anc. Un. History*, vol. 1. Stackhouse's *Hist. of Bible*, vol. 1. Shuckford's *Connection*, vol. 1. (A. F.)

Bab-el-mandeb.

BAB-EL-MANDEB, or **BAB-EL-MANDEL**, the name of a cape and straits at the entrance into the Red Sea. The straits are divided by the island of Perim, which is perfectly flat, and about three miles from the cape. A bay to the eastward of the cape extends inwards a considerable way, and the land between it and the bay on the west is a dry salt sand, and so perfectly flat, that if the sea were to rise only a few feet it would cover it. Part of it is already a lake of salt water. Accidents have sometimes arisen, from mistaking this eastern bay for the strait. These might be avoided, by keeping Perim close on the larboard side, and by observing that Bab-el-mandeb hill is the highest land in the neighbourhood. In Lord Valentia's chart of the Red Sea, the breadth of the straits of Bab-el-mandeb is only 15 British miles. East longitude of the cape 43° 33′, North latitude 12° 40′. See Niebuhr's *Travels*, Bruce's *Travels*, Vincent's *Periplus*, and Lord Valentia's *Travels*, vol. ii. p. 13, 14. (*o*)

BABOON, in zoology, a subdivision of the *ape* tribe, distinguished from their congeners in having a facial angle of about 30°, cheek-pouches, callosities on their posteriors, and either no tail, or one that is very short. See SIMIA and MAMMALIA. (*f*)

BABYLON, CITY OF, the capital of the ancient kingdom of Babylonia, is supposed to have been situated in N. Lat. 32° 34′, and in E. Long. 44° 12′ 30″. It was founded by the first descendants of Noah, 2234 years B. C., enlarged by Nimrod, the great grandson of Noah, 2000 years B. C.; and in a manner completely rebuilt about 1200 years B. C., by the Assyrian Queen Semiramis. It was greatly strengthened and beautified by various succeeding sovereigns; but it was by Nebuchadnezzar and his daughter Nitocris, that it was brought to such a degree of magnificence and splendour, as rendered it one of the wonders of the world.

Situation and extent.

Babylon stood in the midst of a large plain, in a very deep and fruitful soil. It was divided into two parts by the river Euphrates, which flowed through the city from north to south. The old city was on the east, and the new city, built by Nebuchadnezzar, on the west side of the river. Both these divisions were inclosed by one wall, and the whole formed a complete square, 480 furlongs in compass. Each of the four sides of this square had 25 gates of solid brass, at equal distances; and at every corner was a strong tower, ten feet higher than the wall. In those quarters, where the city had least natural defence, there were also three of these towers between every two of the gates; and the same number between each corner, and the nearest gate on its two sides. The city was composed of 50 streets, each 15 miles long, and 150 feet broad, proceeding from the 25 gates on each side, and crossing each other at right angles, besides 4 half streets, 200 feet in breadth, surrounding the whole, and fronting towards the outer wall. It was thus intersected into 676 squares, which extended four furlongs and a half on each of their sides, and along which the houses were built, at some distance from each other. These intermediate spaces, as well as the inner parts of the squares, were employed as gardens, pleasure grounds, &c.; so that not above one half of the immense extent which the walls inclosed, was occupied by buildings.

Walls.

The walls of Babylon were of extraordinary strength, being 87 feet broad, and 350 high. They were built of brick, and cemented by a kind of glutinous earth called bitumen, which had the quality of soon becoming as hard as stone. These walls were surrounded on the outside by an immense ditch, from which the earth had been dug to make the bricks; and which, being always filled with water, added very much to the defence of the city.

Bridge and quays.

On each side of the river Euphrates, was built a quay, or high wall, of the same thickness with the walls around the city. There were gates of brass in these walls opposite to every street which led to the river, and from them were formed descents or landing places by means of steps, so that the inhabitants could easily pass in boats from one side of the city to the other. There was also a remarkable bridge thrown over the river, near the middle of the city, built with wonderful art of huge stones, fastened together by means of iron chains and melted lead; and is said to have been a whole furlong in length, and 30 feet in breadth.

In order to prevent any inconvenience from the swellings of the Euphrates, two canals were cut from that river at a considerable distance above the town, which carried off the superabundant waters into the Tigris. From the place where these canals commenced down the sides of the river, both above and below the city, immense banks were constructed to confine the stream still more effectually within its channel, and to prevent still more completely all danger of an inundation. In order to facilitate the construction of these works, an immense lake was dug on the west side of Babylon, about 40 miles square, and 35 feet deep, into which the river was turned by a canal, till the banks were completed: and it was then restored to its former course. This lake continued afterwards to receive annually a fresh supply of water from the Euphrates, and was rendered very serviceable by means of sluices for watering the lands which were situated below it.

At the two ends of the bridge over the Euphrates were two magnificent palaces, which had a subterraneous communication with each other, by means of a vault or tunnel, under the bed of the river. The old palace, on the east side, was about 30 furlongs in compass, and was surrounded by three separate [illegible], one within the other, with considerable spaces between them. The new palace, on the opposite side, [illegible] about four times as large as the other, and is said to have been eight miles in circumference. The walls of both these edifices were embellished with an infinite variety of pieces of sculpture; and, among the rest, was a curious hunting scene, in which Semiramis was represented on horseback throwing her javelin at a leopard, while her husband Ninus was piercing a lion.

The most remarkable structure in the new palace was the hanging gardens, which Nebuchadnezzar is said to have raised, in order to give his wife Amy[illegible], (daughter of Astyages, king of Media,) some representation of the beautiful mountainous and woody views which abounded in her native country. Th[illegible] gardens occupied a square piece of ground, 400 f[illegible] on every side, and consisted of large terrasses rai[illegible] one above the other, till they equalled in height t[illegible] walls of the city. The ascent from terrass to ter[illegible] was by means of steps 10 feet wide; and the wh[illegible] pile was sustained by vast arches, built upon ot[illegible] arches, and strengthened on each side by a solid [illegible] 22 feet in thickness. Within these arches were [illegible] spacious and splendid apartments, which are desc[illegible]ed as having commanded a very extensive and [illegible]lightful prospect. In order to form a proper pa[illegible]ment for supporting the soil, and confining the m[illegible]ture of the garden, large flat stones, 16 feet [illegible] length, and 4 in breadth, were, first of all, laid up[illegible] the top of the upper arches; over these was spr[illegible] a layer of reeds, mixed with bitumen; upon th[illegible] two rows of brick, closely cemented; and the wh[illegible] covered with sheets of lead, upon which the earth mould was laid to a sufficient depth for the larg[illegible] trees to take firm root. In the upper terrass wa[illegible] large reservoir, into which water was drawn from t[illegible] ter. As soon as Darius was in possession of Babylon, he ordered its hundred gates and its impregnable walls to be demolished; put to death 3000 of those who had been principally concerned in the revolt; and sent 50,000 women from different parts of his empire, to supply the place of those who had been so cruelly destroyed at the commencement of the siege. In the year B. C. 478, Xerxes, the successor of Darius, returning from his inglorious invasion of Greece, passed through the city of Babylon; and, partly from hatred of the Sabian worship, partly with a view to recruit his treasures, plundered the temple of Belus of its immense wealth, and then laid its lofty tower in ruins. In this state it continued till the year B. C. 324, when Alexander the Great made an attempt to rebuild this sacred edifice, and to restore its former magnificence. But, though he employed about 10,000 men in this work for the space of two months, his sudden death put an end to the undertaking before the ground was cleared of its rubbish. This mighty city declined very rapidly under the successors of Alexander; and, in the year 294, A. C. was almost exhausted of its inhabitants by Seleucus Nicator, who built in its neighbourhood the city of Seleucia, or New Babylon. It suffered greatly from the neglect and violence of the Parthian princes before the Christian æra; and every succeeding writer bears testimony to its increasing desolation. Diodorus Siculus, B. C. 44.; Strabo, B. C. 30.; Pliny, A. D. 66.; Pausanias, A. D. 150.; Maximus Tyrius, and Constantine the Great, as recorded by Eusebius,—all concur in describing its ruined condition; and Jerome at length informs us, that, about the end of the 4th century, its walls were employed by the Persian princes as an inclosure for wild beasts, preserved there for the pleasures of the chase. It was visited about the end of the 12th century by Benjamin of Tudela in Navarre, who observed only a few ruins of Nebuchadnezzar's palace remaining, but so full of serpents and other venomous reptiles, that it was dangerous to inspect them nearly. A similar account is given by other travellers; by Texeira, a Portuguese; by Rauwolf, a German traveller in 1574; by Petrus Vallensis in 1616; by Tavernier, and by Hanway; but so very slight are the vestiges now to be found of ancient Babylon, that it is difficult to ascertain exactly the spot on which it once stood, so completely has been fulfilled the prediction of Isaiah: "Babylon, the glory of kingdoms, the beauty of the Chaldees excellency, shall be as when God overthrew Sodom and Gomorrah. It shall never be inhabited, neither shall it be dwelt in from generation to generation; neither shall the Arabian pitch tent there; neither shall the shepherds make their fold there. But wild beasts of the desert shall lie there, and their houses shall be full of doleful creatures; and owls shall dwell there, and satyrs shall dance there; and the wild beasts of the islands shall cry in their desolate houses, and dragons in their pleasant palaces." The striking accomplishment of scripture prophecies, in the conquest, decline, and desolation of Babylon, is very fully illustrated in Rollin's *Ancient History*, vol. ii. p. 140—154.; Newton's *Dissertations*, vol. vii. p. 285.; and Prideaux's *Connect.* vol. i. *passim.* See on the general subject of this article, *Ancient Un. Hist.* vol. iv. p. 403, &c.; vol. i. p. 332, notes. Rollin's *Anc. Hist.* vol. ii. p. 16.; iii. p. 45. Prideaux's *Connect.* vol. i. p. 95, 120, 187, 242, 567. Gillies' *Hist. of World*, vol. i. p. 48. &c. (*q*)

BABYLON, Empire of, may be considered as the first great monarchy of which any records are to be found in history. It appears to have been founded a short time after the flood; and (according to the astronomical tables sent by Alexander to Aristotle) about 2234 years before Christ. Of this first Babylonian kingdom there is very little to be known, except what is related in sacred scripture; that, about 2000 years B. C., it consisted, under Nimrod, of four cities, Babel, Erech, Accad, and Calneh; that, about 100 years afterwards, it was enlarged by Ashur, who built several other cities, and particularly the first Nineveh, on the eastern bank of the Tigris, 300 miles above Babylon; and that it continued till the year B. C. 1230, when Ninus, having overrun the greater part of Asia, founded a second Nineveh, between the rivers Tigris and Euphrates, about 50 miles from Babylon, and thus established what is called the Assyrian monarchy. But what is generally understood by the Babylonian empire, began about 606 years before Christ, when Belesis, or Nebopolassar, hereditary satrap of Babylon, revolted against the Assyrian monarch Sardanapalus; and having destroyed that prince and his capital Nineveh, transferred the seat of power to his own city. Thus there may be said to have been two distinct kingdoms in Babylon; one preceding, and the other following, the Assyrian empire. Or, rather, more properly speaking, there were three great æras of the same monarchy in the country of Assyria. The first of these commences with Nimrod, in the year B. C. 2000, when Babylon was the seat of power; the second with Ninus, in the year 1230, when Nineveh became the metropolis of the empire; and the third with Belesis, in the year 606, when Babylon once more beheld the sovereigns of the East residing in her palaces. This subject indeed is beset with inextricable difficulties, and involved in impenetrable darkness; but the above statement, which is founded upon the observations of the learned and ingenious Dr Gillies, in his History of the World, (vol. i. p. 50, 130,) seems much more simple in itself, as well as more consistent with history, than either the common account, which makes the Assyrian monarchy almost coeval, but altogether unconnected with the first kingdom in Babylon; or that of Sir Isaac Newton, who dates its origin so late as the year B. C. 770.

Leaving our readers to decide this point for themselves, we proceed to the proper subject of this article, namely, to give a short sketch of the second Babylonian empire, established by Belesis, or Nebopolassar, upon the ruins of the Assyrian monarchy, about 606 years B. C.

Nebopolassar, or, as he is also called, Nebuchadnezzar, continued in close alliance with Cyaxares the Mede, by whose assistance he had acquired the sovereignty, and by whose friendship he became so powerful as to excite the apprehensions of the neighbouring princes. While he was employed in resisting the Scythians, who had made themselves masters of Upper Asia, Necho, king of Egypt, invaded his dominions in the south, reduced the city Carchemish, or Circesium, and encouraged the Syrians in that quarter to revolt. Nebopolassar being now well advanced in years, sent his son Nebuchadnezzar, whom he had associated with himself in the empire, to reduce those countries to their former subjection. The young prince defeated the army of Necho near the Euphrates, retook the city of Carchemish, and quelled the insurgents in Syria; entered Judea, and took possession of Jerusalem; restored Jehoiakim to his throne, but carried to Babylon great numbers of the principal Jews, with the treasures of the palace, and part of the sacred vessels in the temple. In the mean time Nebopolassar died, and was succeeded by his son upon his return from his expedition.

NEBUCHADNEZZAR II., called also LABYNETUS, occupied himself, during the first years of his reign, in enlarging and embellishing his capital; and during this period occurred those events which are related in the book of Daniel, chap. ii. His tranquillity was interrupted by the revolt of Jehoiakim in Judea, who was soon reduced by the Babylonian generals; but Jechonias his son, having also attempted to shake off the Assyrian yoke, Nebuchadnezzar went in person to the siege of Jerusalem; and having made himself master of the city, he carried to Babylon all its treasures and sacred utensils, leaving the government to Zedekiah the uncle of Jechonias. Recalled in a short time to Judea by the revolt of Zedekiah, he defeated the Egyptians, who had come to the assistance of the Jews, took Jerusalem by storm, after a twelvemonth's siege, gave it up to pillage and slaughter, put out the eyes of the king, and carried him away captive. Upon his return to Babylon he erected a golden statue in the plain of Dura, sixty cubits in height, and commanded all his subjects to worship it as a divinity. (Dan. chap. iii.) About three years after this event, he again led his forces against the western nations, made himself master of Tyre after a siege of 13 years, overran the whole country of Egypt, returned to adorn his capital with the booty which he had acquired; and, having suffered the punishment of his pride, as related in Daniel, chap. iv. he died in the 44th year of his reign.

EVIL-MERODACH, who succeeded his father Nebuchadnezzar, is described as a weak and licentious prince, and was murdered by his own relatives, after having reigned little more than two years.

NERIGLISSAR, the husband of Evil-Merodach's sister, and one of the chief conspirators, reigned in his stead. Immediately after his accession, he began to make preparations for resisting the growing power of the Medes and Persians. After spending three years in forming alliances, and collecting troops, he marched to meet his opponents Cyaxares and Cyrus; and, in a bloody engagement with the latter, was defeated and slain.

LABOROSOARCHOD, his son, succeeded to the throne. By his cruelty and oppression, he provoked several of his governors to raise the standard of rebellion, and to call in the aid of Cyrus. Marching to suppress these commotions, he was met by the Persian prince, defeated with great loss, and pursued to the very walls of his metropolis. After Cyrus had retired with his army, the Babylonian monarch indulged his vicious propensities to such excess, that his own subjects, unable any longer to endure his tyrannical conduct, conspired against his life, and put him to death, in the ninth month of his reign. He was succeeded by

Babylonian Empire.

Nabonadius.

NABONADIUS, who is called also LABYNETUS, and who is the same with BELSHAZZAR mentioned in sacred scripture. He was the son of Evil-Merodach, by his queen Nitocris; and was the grandson of the great Nebuchadnezzar. His mother Nitocris, who was a woman of extraordinary talents, took upon herself the management of public affairs; and while her son was pursuing his pleasures, she made every exertion to preserve the tottering empire. She completed many of the works which Nebuchadnezzar had begun; and, when Cyrus renewed his attacks upon the frontier towns, she employed the utmost activity in constructing new fortifications for the defence of the capital. Belshazzar at length, in the fifth year of his reign, repaired in person to the court of Crœsus king of Lydia, carrying with him an immense treasure; and with the aid of that prince, as well as by the influence of his wealth, framed a very formidable confederacy against Cyrus. Having hired a numerous army of Egyptians, Greeks, and other nations in Lesser Asia, he appointed Crœsus to the command, and directed him to make an incursion into Media. These auxiliaries having been completely routed, Crœsus taken and dethroned, and Cyrus again advancing to Babylon, Belshazzar attempted to make head against him in the field, but was soon put to flight, and closely blockaded in his capital. After a siege of two years, the city was taken, as has been related in the preceding article; Belshazzar was slain in the assault upon his palace; and with him terminated the empire of the Babylonians, about 538 years before Christ. See Rollin's *Anc. Hist.* vol. ii. p. 34, &c. Prideaux's *Connections*, vol. i. p. 51, &c. *Anc. Univer. Hist.* vol. iv. p. 394, &c. Gillies' *Hist. of the World*, vol i. p. 130, &c. (*q*)

BABYLON, COUNTRY OF, is generally called Babylonia, from the name of its first city Babel; or Chaldea, from the name of its inhabitants, the Chaldeans or Chasdim. When Babylon, instead of Nineveh, was the seat of the supreme power, the words Babylonia and Chaldea were equivalent with Assyria, and comprehended two large tracts of territory on opposite sides of the Euphrates. These were called in scripture, Aram beyond the river, and Aram on this side of the river. To the former, by way of distinction, the Greeks gave the name of Assyria, and to the latter that of Syria. The portion named Assyria, comprehended a space of 700 miles in length, between the rivers Euphrates and Tigris, from the Armenian mountains, in which they rise, to the Persian gulph, into which they then flowed in separate channels. This was divided into three parts, 1st, Mesopotamia, an appellation, indeed, which, in its literal meaning, was applicable to the whole extent, but which was limited to the northern region, where the rivers diverge in general a hundred, and in some places two hundred miles asunder, until, in their course towards the sea, they approach within 20 miles of each other, in the vicinity of Bagdad;

2d, Babylonia, extending from this narrow isthmus about 300 miles towards the Persian gulph, and never exceeding fourscore miles in its breadth between the rivers; and, 3d, The eastern district, properly named Atur, but frequently called Messenè and Adiabenè, lying beyond the Tigris, and reaching to the foot of the Carduchian hills. It is to the second of these that the present article refers, and it is called indiscriminately Babylonia or Chaldea; but, in general, the latter name is used by sacred writers, and the former by profane. Sometimes, indeed, these appellations are appropriated severally to a particular district; the former denoting the country more immediately in the neighbourhood of Babylon, and the latter that which stretches southward to the Persian gulf.

Climate and soil.

The climate of this country is temperate and salubrious, but at certain seasons the heat is so intense, that the inhabitants were accustomed to sleep with their bodies partly immersed in water; and the same practice, according to the testimony of modern travellers, is continued to this day. It seldom rains there above three or four times in the course of a year; and the lands were watered by means of canals, trenches, and various sorts of engines, provided in great abundance for the purpose. The soil naturally rich, and thus carefully supplied with moisture in the driest seasons, surpassed even that of Egypt in fertility; and is said to have generally yielded from 100 to 300 fold. Its vegetable productions grow to so extraordinary a size, that Herodotus declines giving a particular description of them, lest he should incur the charge of exaggeration; but he mentions, as one instance, that the leaves of the wheat and barley were four fingers in breadth. It afforded every where a viscous clay, easily formed by the furnace, or even by the sun, into the hardest bricks; and the naphtha or bitumen, which was extremely abundant, furnished the firmest of all cements.

Government and laws.

The government of this country was of the most despotic description; and the sovereignty was considered as hereditary. Every thing depended upon the will of the prince; and, hence, the laws were undefined, and the punishments arbitrary in the highest degree, (Dan. i. 10; ii. 5; iii. 19.) Three separate tribunals, however, were appointed to administer justice; the first of which took cognisance of adultery, and similar offences; the second of thefts; and the third of all other crimes. The principal officers of state seem to have been the captain of the guard, in whom the executive power resided; the prince of the eunuchs, who took charge of the education and subsistence of the youth of the palace; the prime minister or vizer, who was as the head of the police, and acted as chief justice in the empire; and the master of the magi, whose business it was to interpret prognostications, and divine the events of futurity to the king. The immediate household of the prince appears to have been extremely numerous; and particular districts were appointed to supply the different articles of food which were requisite for the maintenance of the many thousands who daily fed at his tables.

The religious system of the Babylonians bore a near resemblance to that of the Egyptians; and has been very ingeniously ascribed to the following source. The sudden inundations of the Euphrates and Tigris, like those of the Nile, occasioning, alternately, the most rapid beneficial, or destructive changes in the face of nature, attracted the attention, and alarmed the anxiety, of the unenlightened people, who witnessed and experienced their momentous effects. These important changes were observed to have an evident connection with the vicissitudes of the seasons, and the revolutions of the heavenly bodies; and hence, these luminaries, whose influence was understood to be so powerful and extensive, were considered, at first, as the ministers or vicegerents of the Supreme Being, were gradually worshipped as mediators or intercessors for man, and were at length exalted to the rank of separate, but subordinate divinities. The sacerdotal families, devoted to the service of these deities, and thus led by their office to be continually observing the motions of the celestial bodies, gradually acquired such a degree of astronomical skill, as had the appearance of supernatural communications; and gave them a complete ascendency over the minds of the multitude. This power they employed, as their fancy or interest suggested, in prescribing an immense variety of idolatrous rites and modes of worship; the most remarkable of which was the adoration of fire, and the offering of human victims in sacrifice. (See SABIAN *Worship.*) These sacerdotal tribes, who have been called by way of distinction, Chaldeans or Chaldees, were the philosophers as well as the priests of their country. They pretended to have derived their learning from the first instructor Oannes, who sprung from the primogenial egg; who was half man or god, and half fish; who appeared in the Red Sea, and taught the knowledge of letters and civilization in general. This learning, as far as it went, they studied very minutely; and handed it down by tradition from father to son, with any little addition or improvement. It consisted chiefly of some absurd opinions about the formation and shape of the earth, a few astronomical observations, and a confused mass of astrological rules and prognostications of the weather. See CHALDEAN *Philosophy.*

As the priests and philosophers have been particularly distinguished by the appellation Chaldeans, the artists and mechanics have been denominated Babylonians. These appear to have made considerable attainments in geometry, architecture, metallurgy, and the general principles of mechanism; but almost nothing is known of their poetry, painting, statuary, and music. They excelled in the manufacture of rich veils, embroideries, carpets, cloth of gold, and every species of dress or furniture, in linen, cotton, and woollen stuffs. Their country afforded the best materials for dyeing; and their purple, like that of the Tyrians, formed a principal article of traffic. So very precious and splendid, indeed, were the vestments which they prepared, that Cato is said to have sold a Babylonian mantle, which had been left him as a legacy, but which he thought too rich for any one to wear; and that at Rome a set of Babylonian hangings for one apartment was sold for a sum equivalent to £6500 sterling.

If we consider the immense consumption made by the Babylonians of innumerable commodities, which were produced only in countries very remote from their own, it may be fairly concluded, that their opulence must have been very considerable, and their commerce very extensive. Prodigious masses of gold were employed in the statues and other ornaments which their temples contained. Twenty-five tons of frankincense were annually consumed on the altar of Jupiter alone. The people in general delighted in the liberal use of perfumes; and every Babylonian is said to have worn an engraved onyx, sapphire, or emerald, as his signet. Such an abundance of these commodities could have been procured only by the exchange of valuable merchandize, and by a regular communication with distant countries. They were supplied with those articles from northern India; and from the same country they brought, in great numbers, a particular species of hound, a mongrel brood of the dog and tyger, of remarkable size and strength, which was highly esteemed by the Babylonian princes and nobles in their favourite amusement the chase. These animals were so essential to royal magnificence, that whole districts were exempted from every other tribute, except the burden of defraying their maintenance; and even, in later times, they seem to have been equally indispensable to the sovereigns of the East, when the Sultan Bajazet had among the servants of his household 12,000 keepers of dogs. The Babylonian caravans carried on a very extensive traffic also with the countries in the West, penetrating through the Syrian desert to the Phenician traders on the Mediterranean; and proceeding by what was called the royal road, through the north of Asia Minor to the eastern borders of Europe. Their maritime commerce, likewise, was very considerable; and they are characterised by the Hebrew prophet, as a people, "whose cry is in the ships." They had much inland navigation by means of their numerous canals and rivers. The Tigris, on account of its rapidity, was navigable only about 100 miles north of Babylon; but they often sailed 300 miles up the Euphrates to the city of Thapsacus, from which they distributed their spices and perfumes, by land carriage, to the neighbouring districts. In this inland communication, by means of water, the Armenian traders used small vessels of a very peculiar construction. They were little better than large baskets of willow branches covered with hides, of a round form, and guided by two oars or paddles. They were chiefly loaded with palm wine; and some of them were about 12 tons burden. They had frequently asses on board; and, having disposed of their cargo at Babylon, they sold the wooden frame of their boats, loaded these animals with the skins, and returned by land to Armenia. Their largest ships were employed, and their greatest commerce carried on, by their maritime colony at Gerra, which was situated about 200 miles from the mouth of the Euphrates; and whose merchants were the most wealthy and enterprising of all. They maintained an intercourse with the Phœnician factories on the Persian gulf, and with the Ethiopian mines in the neighbourhood of the Red Sea. Thus they had access to the treasures of Sofala or Ophir; and supplied the city of Babylon with the principal part of its spices, perfumes, gems, ebony, ivory, and gold.

Customs, manners, and character of the Babylonians.

One of the most remarkable customs of the Babylonians was the manner in which they disposed of their young women in marriage. They were all brought into the public market-place, where the most beautiful were sold to the highest bidder; and, from the money thus procured, portions were assigned to be given along with those who were deficient in personal attractions. One of their most abominable regulations was that which required every female to suffer prostitution once in her life in the temple of Venus. And one of their most useful practices was that by which they endeavoured to supply the want of professional physicians. The sick were brought out to the public places of resort; and all passengers, of whatever rank, as well as all strangers, of whatever country, were considered as bound in humanity to inquire into the nature of their diseases, and to suggest such remedies as they might have known to be useful in similar cases. The Babylonians were very temperate in their diet, and, like the Hindoos, lived chiefly upon grain; but in their dress and household accommodations, they were very effeminate and extravagant. Their inner garment was of fine linen, descending to their feet; above this, they wore a woollen tunic; and over the whole, was thrown a short white cloak to repel the rays of the sun. Their heads were covered by linen mitres or turbans, plaited with much art; their feet were protected by light slippers; their bodies sprinkled with perfumes; and in their hand they generally carried a staff or cane, shaped at the top into the form of an apple, flower, bird, or some other characteristic emblem. Their habitations were adorned in a manner equally superb; their floors glowed with carpets of the most brilliant colours; and their walls were hung with the most beautiful tissues, named Sindones. They are represented, however, as very degraded in their intellectual and moral character; as credulous and superstitious; debauched and voluptuous in the highest degree; and, to the general prevalence of these luxurious and licentious habits, is unquestionably to be attributed the easy overthrow of such a powerful monarchy, and the immediate subjugation of such a populous empire. See *Anc. Univ. Hist.* vol. iv. p. 332, &c. Gillies's *Hist. of World*, vol. i. p. 60, 72, 168, 195. (*q*)

BABYROUSSA, or BABIROUSSA. See *Sus* MAMMALIA.

BACCHANALIA, ORGIA, or DIONYSIA, the sacred rites of Bacchus were celebrated every third year, hence called *Trieterica*, in the night, chiefly on Cithæron, and Ismeus, in Bœotia; and on Isgnarus, Rhodope, and Edon, in Thrace.

In these rites, it was common for the votaries to put on fawn skins, fine linen, and mitres; to carry *thyrsi*, drums, pipes, and rattles; and to crown themselves with garlands of vine, ivy, &c. Some imitated Pan, Silenus, and the Satyrs; and this motley and frantic multitude ran about the hills and deserts, tossing their heads, and fillingthe air with hideous yells, exclaimingcontinually, "Evoe, Sabae, Attes Hues," &c.

three years more before he can be made master; and seven more to become bachelor of divinity. The degree of bachelor of law may be obtained after the candidate has spent six years in that study.

At Paris, before a person is enabled to pass bachelor in theology, he must have attended for two years to the study of philosophy, and for three years to that of theology, and have held two acts of examination in the Sorbonne. In the canon law none can be admitted bachelor till he has employed two years in the study of that science, and sustained an examination according to the prescribed forms; and to become bachelor of physic, it is necessary to have been four years master of arts, and afterwards to have studied medicine for two years: the student is then invested with the fur, as a preliminary step to his license. Previous to the foundation of divinity professorships in the university of Paris, those who had studied divinity six years were admitted to enter upon their course, and were called *baccalarii cursores.* There were two courses, in the first of which they were engaged, during three successive years, in explaining the Bible, whence they were denominated *baccalarii biblici*; in the second, they were employed for one year in explaining the matter of the sentences; they were then called *baccalarii sententiarii:* when they had completed both courses, they were styled *baccalarii formati, formed bachelors.* The title of *formed bachelor* is now given to one who has regularly obtained his degree, after going through the course of study and exercises required by the statutes; in contradistinction to the *current bachelor,* who is admitted through special favour.

The etymology of the word *bachelor* has been much controverted. It is even extremely uncertain whether it was first employed as a term of military or of literary honour. Among those who suppose it to have been originally a military term, we may mention Cujas, Ducange, Caseneuve, and Altaferra. Cujas derives the word from *buccellarius,* a kind of cavalry once held in great esteem: Ducange maintains that it comes from *baccalaria,* a kind of fees or farms, consisting of several pieces of ground of about twelve acres each, or as much as two oxen could plough; the possessors of which *baccalaria* were called bachelors: Caseneuve and Altaferra deduce it from *baculus,* or *bacillus,* a staff, because the young cavaliers exercised themselves in fighting with staves. Martinus, however, with perhaps more probability, maintains, that this word was, in its primitive application, restricted to those poets who, according to the custom of Italy, were crowned with laurels, and were thence called *baccalaurei,* or *bachelors.* (μ)

BACHELORS, in the livery companies of London, are those who, though members of the company, are not yet admitted to the livery. These companies generally consist of a master, two wardens, the livery, and the bachelors, who are yet only expectants of preferment in their company. (μ)

BACHELORS, in the six companies of merchants in Paris, are those elders, who, having served the offices, are entitled to assist the masters and wardens in some of their duties, particularly in judging of the *chef d'œuvres* of those who stand candidates for the honour of masters.

BACHELOR, in its most general ac
is applied to a man, who remains in a st
libacy.

Almost all nations have regarded bach
set of delinquents, who withhold from tl
important part of its due advantages, an
therefore fairly liable to peculiar penalti
one of the 613 precepts of the Rabbins, th
sons (with very few exceptions) are bound
at the age of twenty; and it is a maxim
among these casuists, that he who does n
vour to leave children behind him ought
counted a homicide.

Among the Lacedemonians, bachelors w
ed with infamy, excluded from all civil an
offices, and even debarred from the public
and amusements. They were obliged to
certain festivals, to be led naked round th
place, and thus exposed to the public derisi
insults were sometimes accompanied with
scourging; and, to complete the affront,
forced to sing certain songs composed for
disgrace. Among the Romans, too, celibac
frequent, was always greatly discourage
were often imposed by the censors on old
and Dionysius of Halicarnassus mentions a
tute, by which all persons were commande
as soon as they reached the age of mat
direct law against celibacy was proposed,
sire of Augustus, by the consuls Papius
pæus, from whom it received the name of
Poppæa. This law, the immediate desig
was to repair the desolation occasioned b
wars, met with great opposition from th
It provided, that whoever in the city sh
three children, in other parts of Italy fo
the provinces five, should be entitled to c
vileges and immunities; and that they wh
celibacy should be incapable of succeedin
heritance, except of their nearest relatio
they married within 100 days after the de
testator.

In this country taxes have occasionally b
on bachelors; and at present, by statute 25
cap. 43, the taxes imposed on the public
are, in some cases, increased with regard to
particularly the duty on servants. (μ)

BACK-GAMMON, the name of a p
interesting game, played by two persons,
and dice, upon a table divided into two p
which there are 12 black and 12 white poi
adversary has 15 men, black and white, to d
them, which are arranged thus: Supposing
into the right-hand table, two upon the ac
your adversary's table, five upon the six-p
opposite table, three upon the cinque-poi
hithermost table, and five on the six-poi
own table: the grand object is to bring
round into your own table; all throws th
bute towards it, and prevent your advers
the same, are advantageous, and *vice ver*
first best throw upon the dice is esteemed
stops the six-point in the outer table, and
cinque in your own, in consequence of w
adversary's two men upon your ace-point

out with either quatre, cinque, or six. The first throw, therefore, is an advantage frequently asked and given between players that are not equally skilful.

In the following article we shall present our readers with an abstract of Hoyle's *Treatise on Back-gammon.*

It is necessary for a learner to know how many points he has the chance of throwing upon the two dice, one throw with another.

There are 36 chances upon two dice.

Throws.	Chances.	Throws.	Chances.
2 Aces	4	5 and 4 twice	18
2 Deuces	8	5 and 3 do.	16
2 Trois	12	5 and 2 do.	14
2 Fours	16	5 and 1 do.	12
2 Fives	20	4 and 3 do.	14
2 Sixes	24	4 and 2 do.	12
6 and 5 twice	22	4 and 1 do.	10
6 and 4 do.	20	3 and 2 do.	10
6 and 3 do.	18	3 and 1 do.	8
6 and 2 do.	16	2 and 1 do.	6
6 and 1 do.	14		—

Points.
Divided by 36)294(8
288
—
6

294 divided by 36, shews, that one throw with another you may expect 8 upon two dice.

The chances upon two dice are as follow:

Throws.	Chances.	Throws.	Chances.
2 Sixes	1	5 and 4 twice	2
2 Fives	1	5 and 3 do.	2
2 Fours	1	5 and 2 do.	2
2 Trois	1	*5 and 1 do.	2
2 Deuces	1	4 and 3 do.	2
2 Aces	1	4 and 2 do.	2
6 and 5 twice	2	*4 and 1 do.	2
6 and 4 do.	2	3 and 2 do.	2
6 and 3 do.	2	*3 and 1 do.	2
6 and 2 do.	2	*2 and 1 do.	2
*6 and 1 do.	2		—
			36

To find out by this table *what are the odds of being hit upon a certain, or flat die,* (the ace for example,) look in the table, where it is thus * marked.

Throws.	Chances.	Throws.	Chances.
*2 Aces	1	*3 and 1 twice	2
*6 and 1 twice	2	*4 and 1 do.	2
*5 and 1 do.	2	*2 and 1 do.	2

Total, ... 11
Which subtracted from . . 36
The remainder is 25

Hence it appears, that it is 25 to 11 against hitting an ace, upon a certain, or flat die. The same method may be taken with any other flat die, as with the ace.

What are the odds of entering a man upon 1, 2, 3, 4, *or* 5 *points?*

Back-Gammon.

		Answer.				Reduced.		
		For.		Against.		For.		Against.
To enter it	upon 1 point is	11	to	25	or nearly	4	to	9
	upon 2 points is	20	to	16		5	to	4
	upon 3 points is	27	to	9		3	to	1
	upon 4 points is	32	to	4		8	to	1
	upon 5 points is	35	to	1		35	to	1

What are the odds of hitting, with any chance, in the reach of a single die?

		Answer.				Reduced.		
		For.		Against.		For.		Against.
To hit	upon 1 is	11	to	25	or nearly	4	to	9
	upon 2 is	12	to	24		1	to	2
	upon 3 is	14	to	22		2	to	3
	upon 4 is	15	to	21		5	to	7
	upon 5 is	15	to	21		5	to	7
	upon 6 is	17	to	19		8½	to	9½

What are the odds of hitting with double dice?

		Answer.				Reduced.		
		For.		Against.		For.		Against.
To hit	upon 7 is	6	to	30	or nearly	1	to	5
	upon 8 is	6	to	30		1	to	5
	upon 9 is	5	to	31		1	to	6
	upon 10 is	3	to	33		1	to	11
	upon 11 is	2	to	34		1	to	17
	upon 12 (or 2 sixes)	1	to	36		1	to	35

To explain farther how to use the table of 36 chances, to find the odds of being hit upon any certain or flat die. This second example shews how to discover by that the odds of being hit upon a 6.

2 Sixes	1	6 and 3 twice	2
2 Trois	1	6 and 2 twice	2
2 Deuces	1	6 and 1 twice	2
6 and 5 twice	2	5 and 1 twice	2
6 and 4 twice	2	4 and 2 twice	2
			—
			17

Which subtracted from . . 36
The remainder is 19

That is, 19 to 17 against being hit upon a 6.

The odds of 2 love are about 5 to 2.
and of . . . 2 to 1 . . . is 2 to 1.
and of . . . 1 love . . . is 3 to 2.

1. If you play three up, your principal object in the first place, is, either to secure your own or your adversary's cinque point; when that is effected you may play a bold game, and endeavour to gammon the adversary.

2. The next best point (after you have gained your cinque-point) is to make your bar-point, thereby preventing your adversary from running away with 2 sixes.

3. After you have proceeded thus far, prefer making the quatre-point in your own tables, rather than the quatre-point out of them.

4. Having gained these points, you have a good chance to gammon your adversary, if he is very much advanced: For, suppose his tables are broken at home, it will then be your interest to open your bar-point to oblige him to come out of your tables with a six; and having your men spread, you not

only may catch that man which your adversary brings out of your tables, but will also have a probability of taking up the man left in your tables, (upon the supposition that he had two men there.) And if he should have a blot at home, it will then be your interest not to make up your tables; because, if he should enter upon a blot, which you are to make for the purpose, you will have a probability of getting a third man; which, if accomplished, will give you at least four to one of the gammon; whereas, if you have only two of his men up, the chance is, that you do not gammon him.

5. If you play for a hit only, one or two of your adversary's men taken up makes it surer than a greater number, provided your tables are made up.

6. *Directions how to carry your men home.*—When you carry your men home, in order to lose no point, you are to carry the most distant man to your adversary's bar-point, that being the first stage you are to place it on; the next stage is 6 points farther, *viz.* in the place where your adversary's five men are first placed out of his tables; the next stage is upon the sixth point in your tables. This method is to be pursued till your men are brought home, except 2, when, by losing a point, you may often save your gammon, by putting it in the power of 2 fives or 2 fours to save it.

7. If you play to win a hit only, endeavour to gain either your own or your adversary's cinque-point; if that fails by you being hit, and he is forwarder than you, then you must throw more men into his tables, thus: Put a man upon your cinque or bar-point, and if your adversary neglects to hit it, you may then gain a forward, instead of a back-game; but if he hits you, you must play for a back-game, and then the greater number of men which are taken up makes your game the better, because you by that means preserve your game at home; and you must then always endeavour to gain both your adversary's ace and trois-points, or his ace and deuce-points, and take care to keep three men upon his ace-point, that if you chance to hit him from thence, that may remain still secure to you.

8. At the beginning of a set do not play for a back-game, because you would thus play to a great disadvantage, running the risque of a gammon to win a single hit.

Directions for playing at the commencement of the game, the 36 chances of the dice, either for a gammon or a single hit.

1. Two aces, to be played on your cinque-point and bar-point, for either gammon or hit.

2. Two sixes to be played on your adversary's bar-point, and on your own bar-point, for a gammon, or hit.

3. * Two trois, two to be played on your cinque-point, and the other two on your trois-point in your own tables, for a gammon only.

4. † Two deuces, to be played on your quatre-point in your own tables, and two to be brought over from the five men placed in your adversary's tables, for a gammon only.

5. ‡ Two fours, to be brought over from the five men placed in your adversary's tables, and to be put upon the cinque-point in your own tables, for a gammon only.

6. Two fives to be brought over from the fiv men placed in your adversary's tables, and to be pu upon the trois-point in your own tables, for a gammon, or hit.

7. Six ace, you are to take your bar-point, for gammon, or hit.

8. Six deuce, a man to be brought from the fiv placed in your adversary's tables, and to be place on the cinque-point in your own, for a gammon, o hit.

9. Six and three, a man to be brought from you adversary's ace-point, as far as he will go, for a gammon, or hit.

10. Six and four, a man to be brought from you adversary's ace-point, as far as he will go, for a gammon, or hit.

11. Six and five, a man to be carried from you adversary's ace-point, as far as he can go, for a gammon, or hit.

12. Cinque and quatre, a man to be carried fro your adversary's ace-point, as far as he can go, for gammon, or hit.

13. Cinque-trois, make the trois-point in your tables, for a gammon, or hit.

14. Cinque-deuce, play two men from the fi placed in your adversary's tables, for a gammon, o hit.

15. * Cinque-ace, bring one man from the fiv placed in your adversary's tables for the cinque, and play one down on the cinque-point in your own tables for the ace, for a gammon only.

16. Quatre-trois, bring two men from the five placed in your adversary's tables, for a gammon, or hit.

17. Quatre-deuce, make the quatre-point in you own tables, for a gammon, or hit.

18. † Quatre-ace, play a man from the five place in your adversary's tables for the quatre, and for th ace play a man down upon the cinque-point in you own tables, for a gammon only.

19. Trois-deuce, bring two men from the fi placed in your adversary tables, for a gammon onl

20. Trois-ace, make the cinque-point in your o tables, for a gammon, or hit.

21. * Deuce-ace, play one man from the five plac in your adversary's tables for the deuce; and for t ace, play a man down upon the cinque-point in yo own tables, for a gammon only.

Directions how to play the chances that are mark thus (*) for a hit only.

1. * Two trois, play two of them on the cinq point in your own, and with the other two take t quatre-point in your adversary's tables.

2. † Two deuces, play two of them on the quat point in your own, and with the other two take t trois-point in your adversary's tables.

By playing the two foregoing cases as direct you avoid being shut up in your adversary's tabl and have the chance of throwing high doublets, win the hit.

3. * Two fours, two of them are to take your versary's cinque-point in his tables; and for the ot

two bring two men from the five placed in your adversary's tables.

4. * 1. Cinque-ace, play the cinque from the five men placed in your adversary's tables, and the ace from your adversary's ace-point.

5. * 2. Quatre-ace, play the quatre from the five men placed in your adversary's tables, and the ace from those on your adversary's ace-point.

6. * 3. Deuce-ace, play the deuce from the five men placed in your adversary's tables, and the ace from your adversary's ace-point.

N. B. The three last chances are to be played in this manner, because, by laying an ace down in your adversary's tables, you have a probability of throwing deuce-ace, trois-deuce, quatre-trois, or six-cinque, in two or three throws; in any of which cases you are to make a point, which gives you the better of the hit; and observe by the directions already given, that you are to play nine chances out of the thirty-six in a different manner, for a single hit, to what you would do when playing for a gammon.

General Observations.

1. By the directions given to play for a gammon, you are voluntarily to make some blots; the odds being in your favour that they are not hit; but should that so happen, in such case, you will have three men in your adversary's tables; you must then endeavour to secure your adversary's cinque, quatre, or trois-point, to prevent a gammon, and must be very cautious how you suffer him to take up a fourth man.

2. Take care not to crowd your game, that is, putting many men either upon your trois or deuce-point in your own tables; which is, in effect, losing those men by not having them in play. Besides, by crowding your game, you are often gammoned; as when your adversary finds your game open, by being crowded in your own tables, he may then play as he thinks fit.

3. By referring to the calculations, you may know the odds of entering a single man upon any certain number of points, and play your game accordingly.

4. If you are obliged to leave a blot, by having recourse to the calculations for hitting it, you will find the chances for and against you.

5. You will also find the odds for and against being hit by double dice, and consequently can choose a method of play most to your advantage.

6. If it is necessary to make a run, in order to win a hit, and you would know who is forwardest, begin with reckoning how many points you must have to bring home to the six-point in your tables the man that is at the greatest distance, and do the like by every other man abroad; when the numbers are summed up, add for those already on your own tables (supposing the men that were abroad as on your six-point for bearing), namely, six for every man on the six, and so on respectively for each; five, four, three, two, or one, for every man, according to the points on which they are situated. Do the like to your adversary's game, and then you will know which of you is forwardest, and likeliest to win the hit.

Observations and Directions for a Learner to bear his Men.

1. If your adversary is greatly before you, never play a man from your quatre, trois, or deuce points, in order to bear that man from the point where you put it, because that nothing but high doublets can give you any chance for the hit: therefore, instead of playing an ace or a deuce from any of the aforesaid points, always play them from your highest point; by which means, throwing two fives, or two fours, will, upon having eased your six and cinque points, be of great advantage: whereas, had your six-point remained loaded, you must, perhaps, be obliged to play at length those fives and fours.

2. Whenever you have taken up two of your adversary's men, and happen to have two, three, or more points made in your own tables, never fail spreading your men, either to take a new point in your tables, or to hit the man your adversary may happen to enter. As soon as he enters one, compare his game with yours; and if you find your game equal, or better, take the man if you can, because it is 25 to 11 against his hitting you; which being so much in your favour, you ought always to run that risk, when you have already two of his men up: except you play for a single hit only, and playing that throw otherwise gives you a better chance for the hit, then do not take up that man.

3. Never be deterred from taking up any one man of your adversary by the apprehension of being hit with double dice, because the fairest probability is 5 to 1 against him.

4. If you should happen to have five points in your tables, and to have taken up one of your adversary's men, and are obliged to leave a blot out of your tables, rather leave it upon doublets than any other, because doublets are 35 to 1 against his hitting you, and any other chance is but 17 to 1 against him.

5. Two of your adversary's men in your tables are better for a hit than any greater number, provided your game is forwardest; because having three or more men in your tables gives him more chances to hit you, than if you had only two men.

6. If you are to leave a blot upon entering a man on your adversary's tables, and have your choice where, always chuse that point which is the most disadvantageous to him. To illustrate this, suppose it is his interest to hit or take you up so soon as you enter: in that case leave the blot upon his lowest point; that is to say, upon his deuce, rather than upon his trois, and so on, because all the men your adversary plays upon his trois or his deuce-points are in a great measure out of play, those men not having it in their power to make his cinque-point, and consequently his game will be crowded there and open elsewhere, whereby you will be able also much to annoy him

7. Prevent your adversary from bearing his men to the greatest advantage, when you are running to save a gammon: suppose you should have two men upon his ace-point, and several others abroad; though you should lose one point or two in putting the men into your tables, yet it is your interest to leave a man upon the adversary's ace-point; which will prevent

Back-Gammon | Bacon, Roger.

him bearing his men to his greatest advantage, and will also give you the chance of his making a blot, that you may hit. But if, upon a calculation, you find you have a throw, or a probability of saving your gammon, never wait for a blot, because the odds are greatly against hitting it.

Laws of Back-gammon.

1. If you take a man or men from any point, that man or men must be played.

2. You are not understood to have played any man till placed upon a point, and quitted.

3. If you play with 14 men only, there is no penalty attending it, because with a lesser number you play to a disadvantage, by not having the additional man to make up your tables.

4. If you bear any number of men before you have entered a man taken up, and which consequently you was obliged to enter, such men, so borne, must be entered again in your adversary's tables, as well as the man taken up.

5. If you have mistaken your throw, and played it, and if your adversary has thrown, it is not in your or his choice to alter it, unless both parties agree.

BACK STAFF, or BACK QUADRANT, the name of an instrument invented by Captain Davis, for taking the altitude of the sun at sea. It is called the English quadrant by the French. See QUADRANT. (*j*)

BACON, ROGER, known also by the appellation of the *Admirable Doctor*, was the greatest philosopher of the 13th century, and, in the estimation of some respectable writers, the brightest genius which modern Europe ever produced. He was born at Ilchester, in the year 1214, and, to the utmost verge of a long life, employed his versatile talents in cultivating the richest fields of science and literature. His early studies, at Oxford, were pursued with an eagerness and assiduity, which, at the same time, insured success, and earned the strongest marks of favour from his instructors. Transferring the scene of his education from England to France, in conformity with the usual practice of the times, he availed himself of the prelections delivered by the most distinguished professors in the university of Paris. His extraordinary attainments, however, are to be attributed less to any advantages derived from scholastic tuition, than to his own intense and indefatigable application. If we form an estimate of the merits of his contemporaries from the voluminous remains of the applauded triumvirate, Albertus, Aquinas, and Bonaventura, to whose irrefragable authorities almost every school paid implicit deference, and whose names eclipsed the glories of all their rival doctors, we shall easily perceive how little Bacon owed to his preceptors, and how much may be achieved by the well-directed labours of a sound and vigorous mind. His intimate knowledge of Oriental and Grecian learning was unrivalled, in an age when minute attentions to words constituted the whole of what was called erudition, and when frivolous philological distinctions were mistaken for the profundities of abstract science. But to his higher praise be it recorded, that, though long assailed by the rancour of prejudice, and obstructed by the vengeance of bigotry, he was the first in modern times, who, spurning the trammels of veteran authorities, pointed out the true road to discovery, and demonstrated the utility of his method, by exemplifying it in a brilliant train of successful investigations. At Paris he was advanced to the degree of doctor in divinity; and when he was twenty-six years of age, he entered into the community of Friars-Minor, (or Grey Friars,) founded by St Francis; a monastic order which was then rising into great influence. About this time he returned to Oxford, where, having obtained a very extensive and valuable apparatus, he devoted himself chiefly to the study of mechanics, optics, astronomy, and chemistry. The mendicant brotherhood, to whose society he was unfortunately united, envious of his matchless honours, or fearful of his future ascendancy, conspired to blast the reputation, and to defeat the liberal ambition of one whose aims, uncontaminated by secular views, were exclusively directed to the advancement of the highest and most useful branches of human knowledge. He was slanderously reported to be addicted to necromancy and the unholy "communion of devils;"—and so powerful were the secret intrigues of his adversaries, that, though the heads of the university were friendly to his interest, it was deemed expedient, not only to prevent him from taking any share in the instruction of the youth, but even to condemn him to a rigorous confinement, aggravated by the harshest privations, and uncheered by the offices of friendship. It is said, that this hostility was inflamed by other passions not less cruel than jealousy. The monks and ecclesiastics were exasperated by the just animadversions which Bacon had been heard to pass on the gross ignorance and errors of the religious orders, and by the indignant severity with which he had censured their prevalent vices. On the exaltation of Clement IV. to the papal dignity, he obtained a temporary respite from his persecutions; and this interval of unmolested quiet, was dedicated with fresh ardour to the favourite occupations which had never ceased to engage his mind. Clement enjoyed his dignity only for three years; and his successor, Gregory X., was too much engrossed with the miseries of the Christians in Palestine, to bestow a single thought on the protection of a philosopher's retirement, or the redress of a philosopher's wrongs. It does not appear, however, that the personal liberty of Bacon was again abridged till the year 1278, when he was seized and imprisoned in France; and at the same time, an order was given by the guardian of the Franciscans, Jerome d'Ascoli, bishop of Palæstrina, afterwards Nicolas IV., interdicting the perusal of his writings. He lingered in this captivity for more than ten years; but at length he regained his freedom, and once more found his way to Oxford, where, at the venerable age of seventy-eight, death put a period to his labours and vexations, in the year 1292.

The published works of this great man are not numerous. The best known of these works is entitled *Opus Majus*, containing an abstract of his other treatises. An edition of this book was printed by Bowyer in 1733, under the inspection of Dr Jebb. Another book, under the title of *Epistolæ*

Fratris Rogeri Baconis de secretis operibus artis et naturæ, et de nullitate magiæ, has passed through several editions. A treatise addressed to Nicolas IV., *On the Means of Avoiding the Infirmities of Age*, has been repeatedly printed; and several chemical essays written by him are inserted in the *Thesaurus Chemicus*, printed at Frankfort, in 1603 and 1620. Some of his manuscripts perished in the ruin of the Franciscan library at the Reformation; and a number of others have been discovered in the different libraries of Oxford; but little appears to be ascertained with regard to their value.

The present age is disposed to do ample justice to Friar Bacon, as the greatest ornament whose name was ever enlisted among the followers of St Francis; and the foul aspersions cast on him in his lifetime, may be numbered among the most unequivocal testimonies to his worth. Admiring posterity sickens at being told, that the precious gem, which was capable of dazzling the whole intellectual world, was shut up from the view of a worthless generation, by the ignoble artifices of priestly zealots; but, with this bitter sensation, the most oppressed and friendless son of genius may delight to mingle the consolatory recollection, that from the joyless cell of Bacon issued the first vivid gleams of that unquenchable flame, which, after the lapse of ages, was destined to burst forth with augmented splendour, guiding the steps of the inquisitive in the paths of discovery, and lighting prostrate nations to the means of securing the inestimable liberties of conscience, and all the sacred immunities of free born men.

In exposing the futility and emptiness of monkish learning, Roger Bacon displayed the characteristic keenness of a great and original mind, confident of its own unquestionable right to speak with decision. We have already hinted at his vast acquirements in ancient learning. He contributed, more than any person of his age, to revive the neglected study of mathematics. His progress in mechanics and chemistry was so great, that he anticipated some of the proudest discoveries of subsequent times. The invention of gunpowder is now universally assigned to him, though it was claimed by a monk of the following century. He is the first writer who hints at any thing like the science of Aeronautics; and he speaks obscurely of many mechanical contrivances of vast power, the principles of which it is not easy to ascertain. His astronomical knowledge suggested to him that correction of the calendar which was adopted in the 16th century by Gregory XIII. His proficiency in optics, considering the disadvantages under which he laboured, was truly wonderful. He was no stranger to the use of convex and concave lenses, the laws of refraction, the theory of mirrors, the power of burning glasses, and the grand invention of the telescope. He wrote also many treatises on grammar, geography, chronology, logic, metaphysics, ethics, theology, and medicine. That he was enticed into the wild speculations of alchemy, is the greatest cloud which hangs over his memory; and it is much to be regretted, that this epidemical infatuation of the times should have impeded his progress in the loftier and more profitable researches of truth. Fiction, however, has taken many unwarrantable liberties with his name; and some of the accounts which have been propagated, with regard to his attachment to occult and fanciful sciences, are sufficiently disproved by the authentic record of his writings. It would have been easy to amplify the list of his discoveries and sage conjectures; but it is enough to say, that whatever were the subjects which attracted his notice—and these included all the branches of human knowledge—he far outshone all the boasted luminaries of the age, all the *subtle*, *profound*, and *seraphic* doctors, whose once-idolized names are now sinking in the oblivious gulph of time. See Cave *Hist. Lit* Wood, *Antiq. Oxon.* Waddingi *Annales Minor.* Borrich *De Orig. Chem.* Pits *De illustr. Angl. Script.* Bale, *Script. Brit.* (m. s.)

BACON, Sir Nicolas, an English lawyer of great reputation, was born at Chislehurst, in Kent, in the year 1510. After studying at Cambridge, and travelling for some time in France, he entered into the society of Gray's Inn, and arrived at such eminence in the knowledge of law, that he was appointed king's attorney in the court of records. This office he held under Henry VIII. and Edward VI.; and when Elizabeth ascended the throne, he was made lord keeper of the great-seal, with a rank equal to that of chancellor. His royal mistress reposed unlimited confidence in his prudence and integrity, and the Protestants of that day revered him as one of the steadiest supporters of their interests. He conducted himself with equal firmness and moderation in his dignified office, and after having enjoyed it more than twenty years, died at the age of sixty-nine; leaving behind him the character of a faithful and discreet member of the council, an ingenious scholar, an eloquent, argumentative, and witty speaker, and a chief pillar of the state. He was the author of some political tracts,—of an exposition of the twelve minor prophets,—and of some commentaries on questions of law. See Mallet's *Bacon*, and Sir R. Naunton's *Fragmenta Regalia*. (m. s.)

BACON, Francis, Lord Verulam, and Viscount St Albans, a philosopher, whose writings form a new epoch in the history of science, was born at York-house, London, on the 22d day of January 1560-1. He was the youngest son of Sir Nicolas Bacon, by his second wife Anne, daughter of Sir Antony Cook, tutor to Edward VI.

In his childish years, Francis Bacon displayed an uncommon precocity of talent; and the early presages of his superiority were amply verified by the fruits of his maturer studies. The gravity and propriety of his demeanour, when a boy, recommended him to the good graces of Queen Elizabeth, who often admired the neatness and felicity with which he replied to her questions. In his thirteenth year, he was committed to the care of Dr Whitgift, then master of Trinity College, Cambridge, afterwards Archbishop of Canterbury; and at the age of sixteen, according to his own account, he began to be dissatisfied with the philosophy of Aristotle, which had long formed the basis, or rather the whole substance, of academical instruction. His father having destined him to the service of the state, found means to initiate him into the mysteries of the diplomatic life, by sending him to France, in his seventeenth year, with Sir Amias Powlet, the ambassador. In this situation he enjoyed the entire confidence and approbation of his patron, by whom he was, in one instance, charged with a very important commission to the queen, in which he acquitted himself with great ability. About this time also he wrote an inquiry into the state of Europe, which afterwards gained him considerable applause in the political world. When he was nineteen years of age, a gloom was thrown over his future prospects by the sudden death of his father, from whom he inherited a very small patrimony, as the youngest of five brothers.

Returning from France, he determined to study law; and, with this view, entered the honourable society of Gray's Inn, where he soon rose to great eminence, and, at the age of twenty-eight, was chosen their Lent reader. Two years afterwards he was made one of the clerks of the council. About this period his time was divided between the studies of law and philosophy; but his most ardent affections were set on the high offices of state; and to the attainment of these favourite objects, he seized every opportunity of applying. He long and anxiously courted the good graces of Lord Essex, and had also frequent access to the queen, who gave him great reason to believe that she was favourably disposed towards him. Her majesty, however, bestowed upon him no substantial mark of her regard, except the reversion of a lucrative office, that of register to the star-chamber, which became vacant about twenty years afterwards. It is alleged, that the antipathy or jealousy of Cecil, then secretary of state, obstructed his preferment, partly because the secretary disliked his attachment to the fortunes of Essex, and partly because he dreaded the ascendancy of his talents. Cecil is said to have been at great pains to impress on the queen's mind a conviction, that Bacon, being always immersed in abstract speculation, was ill qualified for the activity of public business; and it is to be regretted, that these insinuations, however questionable the motives which dictated them, did not operate as a permanent obstacle to his elevation. If he had been content with a private station, his philosophical inquiries might have been more successfully conducted; and those temptations might have been escaped, which afterwards had power to corrupt his integrity. The subsequent conduct of Bacon to his benefactor, the unfortunate Earl of Essex, who had not only strained every nerve to ingratiate him with the queen, but augmented his fortune by some munificent donations, drew down on him the most unqualified expressions of public reprobation, and affixed a stain to his memory which the lustre of his talents serves only to render more conspicuous. The obsequious candidate for courtly favour, prostituted his abilities by pleading against the man who had protected and enriched him, and violated the holy bonds of friendship, by extracting evidences of his patron's guilt from private letters which he spontaneously produced. As if all this had been too little, he was selected as the fittest instrument for attacking the posthumous fame of his sacrificed friend, and condescended to gratify the queen and the ministry, by publishing an elaborate *Declaration of the Treasons of Robe* *Earl of Essex.* His miserable *Apology* for his con duct, tended, in the opinion of the nation, rather t aggravate than to extenuate the baseness of desertin the man on whom he had long fawned; and thirsting for the infamy of one, whose blood might hav satiated the hireling retainers of power. Elizabet never requited Bacon for the execution of his odiou task; and the ministry had no great encouragemen to be lavish of their gifts to a man, who had prove himself capable of inflicting the deepest wounds o the object of his former adulation. Before this tim he had incurred the queen's displeasure, in conse quence of the freedom with which he expressed hi opinions in parliament, of which he became a mem ber in 1592.

After the death of Elizabeth, the career of hi ambition was more prosperous. Before James I. ar rived in England, Bacon wrote letters to all th Scottish gentlemen of whom he had the slightes knowledge, offering his services to the king, and ear nestly soliciting their interest to procure him employment in the affairs of state. He was one of the [illegible] persons, on whom the honour of knighthood wa conferred, soon after the accession of the new sove reign; and he was also appointed one of the king's counsel learned. The endeavours of Cecil, Earl of Salisbury, could not now defeat the servile arts by which Bacon rose progressively through so many steps of preferment. In 1605 he recommended himself to the notice of James, by addressing to him his great work *Of the Advancement of Learning*, in the introduction to which he compliments that pedantic monarch, as being incomparably superior in judgment, learning, eloquence, and every princely attribute, to Julius Cæsar, Marcus Antoninus, Hermes Trismegistus, and all the potentates and demigods of ancient times. In 1607 he was appointed solicitor-general. Four years afterwards he was made joint judge of the knight marshal's court. In 1613 he became attorney-general, and was sworn member of the privy council. In 1617, he was raise to the high office of keeper of the great seal of England; and on the 4th of January 1619, he was ad vanced to the greatest legal dignity which the favou of his master could bestow,—the office of lord chan cellor, an office which he had long laboured to pro cure, not only by descending to the most humiliatin importunities, but also by vilifying the talents an principles of his rivals. In the course of the sam year he was successively created Baron Verulam, an Viscount St Albans. James had advanced him no less than nine times: six in office, and three in dig nity. After having thus rapidly attained the clima of his hopes, he sunk with still greater rapidity int the lowest degradation.

It is well known that the parliament which me in 1621, acted with a firm and determined boldnes of which there had previously been few examples i the history of England. In the examination of gri vances, the commons were led to attend particularl to some patents for monopolies, which had excite loud murmurs among the subjects. Bacon and th other officers of state were supposed to have bee the agents of Buckingham in obtaining these oppres sive instruments. But charges of a more personal nature arose against the chancellor; and the House of Commons, after receiving the complaints of a great number of individuals, reported them to the lords, and accused his lordship of having, in his judicial capacity, received bribes from suitors before the court of chancery. At first he endeavoured to shelter himself from the effects of a minute investigation, by mingling vague protestations of his upright intentions with a reluctant confession, that, through the weakness of human nature, and the influence of evil example, he might have erred; at the same time labouring to persuade his judges, that the deprivation of his office would have a more salutary effect in preventing future delinquency, than the infliction of a severer punishment. His judges, not mollified by his submission, required him to give in a specific answer to all the charges. He sent a letter to the House, acknowledging himself guilty in almost all the twenty-eight articles, and attempting to palliate his criminality in a few of them. On the 3d of May, six weeks after the investigation commenced, the following sentence was pronounced: "Upon complaint of the commons against the Viscount St Albans, lord chancellor, this high court hath thereby, and by his own confession, found him guilty of the crimes and corruptions complained of by the commons, and of sundry other crimes and corruptions of like nature; and therefore this high court having first summoned him to attend, and having his excuse of not attending by reason of infirmity and sickness, which he protested was not feigned, or else he would most willingly have attended, doth nevertheless think fit to proceed to judgment, and therefore this high court doth adjudge, That the Lord Viscount St Albans shall undergo fine and ransom of £40,000; that he shall be imprisoned in the Tower during the king's pleasure; that he shall for ever be incapable of any office or employment in the state or commonwealth; that he shall never sit in parliament, or come within the verge of the court."

The only extenuation of Bacon's corruption, which has ever been attempted, is thus pleaded by Addison. "His principal fault seems to have been the excess of that virtue which covers a multitude of faults. This betrayed him to so great an indulgence towards his servants, who made a corrupt use of it, that it stripped him of all those riches and honours which a long series of merits had heaped upon him." This lame apology, feebly hinted at by the chancellor himself, deserves little notice. His connivance at the extortions of his servants was one of the corruptions charged on him; and his guilt will not be lessened by the supposition, that the support of their extravagance led him to all his other acknowledged acts of venality. To say that his unrighteous gains were not avariciously hoarded, but lavished on his unworthy dependents, or that want of economy had plunged him into difficulties, or that it is charity to wink at violations of justice, is to insult the moral feelings of mankind; and on the same principles we must excuse the depredations of every marauding chief, who shares the spoil with the partakers of his enormities. That the practice of taking presents had long prevailed in the court of chancery, is not disputed; but it is scarcely credible, that former chancellors could have safely carried it on to the same immoderate extent, to which it appeared, on the trial, to have proceeded in a single year; and no precedent could form an excuse for such palpable baseness.

The sentence of the high court of parliament was not rigorously inflicted. After a short imprisonment, he was released from the Tower, and the other parts of his sentence were also remitted by the king, who granted him a pension of £1800 a year. The remainder of his days was passed in contemplation. Though at the time of his fall he was sixty years of age, the vigour of his understanding, and the intensity of his application to study, were not in the smallest degree impaired. During the period of his humiliation, under the disadvantages of declining health, dejected spirits, and embarrassed circumstances, he employed himself in writing and revising those valuable works, which have, in a great measure, redeemed his name from disgrace, and placed him in the first rank of modern philosophers. He died at Highgate on the 9th of April 1626, from the effects of some incautious experiments on the preservation of bodies. He was buried in St Michael's church at St Albans, where a monument of white marble was erected to his memory. He is represented sitting in a contemplative posture, and underneath is an inscription written by Sir Henry Wotton, to the following purpose: *Franciscus Bacon Baro de Verulam, St Alb. Vic., seu notioribus titulis, Scientiarum Lumen, Facundiæ Lex, sic sedebat: Qui, postquam Omnia Naturalis Sapientiæ et Civilis Arcana evolvisset, Naturæ decretum explevit.*

The countenance of Bacon was strongly expressive, and his ordinary conversation indicated the quickness and universality of his talents. In his person he was of the middle stature, and his figure was good; but his constitution was by no means athletic. He had a spacious forehead, dark hair and eye-brows, a black penetrating eye, generally looking upward, a very grave cast of features, and a capacity of speaking like a master on every subject. "At one time, (says Osborn,) he would entertain a country lord, in proper terms, relating to horses and dogs; and, at another time, outcant a London surgeon." His opinions and assertions were received as oracles; but he always encouraged others to speak their sentiments, and, in repeating the observations which he thus drew forth, he never failed to clothe them with a new dignity and grace, and to enrich them with the additions of his own wisdom. Thus, (to use the words of his chaplain, Dr Rawley,) "he would light his torch at every man's candle." A remarkable peculiarity in his constitution is gravely attested by the same biographer. "It would seem the moon had some principal place in the figure of his nativity; for she never was in her passion, but he was seized with a sudden fit of fainting, and that though he took no previous knowledge of the eclipse." He was married about the age of forty, to a daughter of Alderman Barnham, a lady of considerable fortune, by whom he had no progeny. In the discharge of his public functions, it is said, that he always acted with courteousness and humanity, or, as the king expressed it, "*suavibus modis*;" but there is too great

Bacon, Francis.

reason to suspect that his urbanity was altogether artificial, and his affections cold and selfish. As a lawyer, he attempted to rival Sir Edward Coke, one of the greatest ornaments of the bench; and in point of eloquence, he was perhaps superior to that great man. Over his moral infirmities truth forbids us to throw the veil of silence. His grosser corruptions, which drew down on him the vengeance of the laws and the contempt of all honest men, are sufficiently blazoned in the page of English history. But it is perhaps equally mortifying to reflect on that deficiency of principle, that absence of ingenuous feeling, that tendency to dissimulation, that everlasting struggle to aggrandize himself by menial arts and beggarly importunities, and even by the more sordid instrumentality of detraction; all of which may be traced in the undoubted memorials of his private life, from the inauspicious moment when his father thought fit to direct his steps into the tortuous paths of political intrigue. To the early bias which he acquired in the train of an ambassador at the court of France, we are disposed to ascribe many of his future aberrations. It may seem harsh, to pronounce so freely concerning the abject disposition of a man whom posterity reveres. But he has taken care to perpetuate the remembrance of his own servility. We cannot accuse his biographers of having imprudently rifled the repositories of a departed friend, that they might add to the magnitude of his remains, by recording the garrulity of his private hours, and even the traces of his frailties. He bequeathed his letters and speeches to Dr Williams, bishop of Lincoln, (his successor as lord keeper,) leaving him at liberty to publish them; and this, according to his own account, he did in imitation of Demosthenes, Cicero, and Pliny, who carefully preserved their orations and epistles. Not content with writing a letter to this purpose, he thought fit to give his injunction greater solemnity, by inserting it in his will. What can be more disgusting than the fulsome parasitical flattery contained in his letters to the favourite Villiers? Who would believe that the immortal Bacon, at the age of fifty-five, was capable of bending so low as to profess it to be his greatest ambition to be the best servant of the king's stripling minion? His letters to this dissolute youth, when only in the dawn of his honours, are most elaborately written, and, as several copies of some of them, with considerable variations, have been preserved, it is evident that he made repeated attempts, before he could satisfy himself with the laboured compliments and specious pretences, by which he strove to make Villiers believe, that in forwarding his wishes, he would gain lasting honour to himself.

From this humiliating picture, we turn with satisfaction to review the unperishable monuments of Bacon's genius. In the intervals of his professional studies at Gray's Inn, he had conceived the design of a great undertaking, to the accomplishment of which he applied with incredible vigour, amidst the multiplied interruptions and disquietudes of a bustling life. We have already noticed his early dissatisfaction with the Aristotelian doctrines; and though he was not the first, who discerned the inutility of the scholastic logic as an instrument of discovery, he was certainly the first, who endeavoured to reduce into a methodical digest, the legitimate rules of philosophising. His first work, which in some degree unfolded his plan, was printed in 1605, and professed to treat "Of the Proficience and Advancement of Learning." It was afterwards greatly enlarged and improved; and, having been translated into Latin by the Rev. George Herbert and some other scholars, was published under the well known title, *De Dignitate et Augmentis Scientiarum.* The important object which the author proposed was, to trace the boundaries of the sciences then known, to point out their mutual connections and dependencies, to exhibit a view of their relations to the different faculties of the human mind, to introduce a natural classification of their various branches, and to enumerate the defects and omissions in all the attempts made by former inquirers. According to Bacon, all the varieties of human knowledge may be ranged under history, poetry, and philosophy, corresponding to his division of the intellectual faculties into memory, fancy, and reason. He distributes history into natural and civil; poetry into narrative, dramatic, and parabolic; science into theology, and philosophy; the latter relating to the Deity, nature, and man; which is merely a repetition of Aristotle's classification. An analysis of this work could convey no adequate idea of its value. Though debased by a considerable proportion of trifling matter, it contains many profound, acute, and original observations, and evinces an extent of erudition, a clearness of apprehension, and a solidity of judgment, which claim the highest admiration. A number of the particulars which he marks as *desiderata*, or as undiscovered regions in the world of science, are indeed more fantastical than solid; and it is greatly to be regretted, that the whole of the performance is obscured by a cumbersome load of uncouth and affected phraseology. Thus he divides natural philosophy into the mine and the furnace, and the philosophers into pioneers and smiths, or diggers and hammerers; the former engaged in the inquisition of causes, the latter in the production of effects; the former speculative, the latter operative. Our limits do not permit us to enter into a critical examination of Bacon's arrangement of the sciences, against which it is easy to propose many objections; but no less exceptionable arrangement has hitherto been offered to the world.

The work which Bacon esteemed the chief of his writings, the *Novum Organum Scientiarum*, was printed in 1620, a short time before his fall. It was intended to supply one of the great defects which he had noted in the method of directing the human faculties, the want of a rational or inventive logic. His opinions on this subject are condensed into the form of aphorisms. Instead of the ancient method of syllogism, he proposed to conduct philosophical inquiries by what he called induction, in which we rise from an extensive collection of particular facts to general conclusions. He laid down a series of rules for making observations and conducting experiments. But the most essential service which he has rendered to science, is the investigation of those causes of false judgment, which are most intimately connected with the natural and acquired dispositions of the mind. These sourses of error he has numbered under four heads, which he calls *idola tribus*, *idola specus*, *idola fori*, and *idola theatri;* by which terms he means the prejudices arising, 1. From the original and universal dispositions of the human mind; or, 2. From the peculiarities of individual constitutions and habits; or, 3. From the imperfections and abuses of language, the medium of communication between man and man; or, 4. From the attachment to prevalent theories and erroneous rules of judging. The object of the whole work was to reclaim men from the devious and intricate paths, in which they had long wandered, to the sound and profitable application of their understandings. Its principal fault is the obscurity resulting from the want of illustrations; a fault not chargeable on the author, who could not be expected to invent specimens of a mode of proceeding hitherto little cultivated. James I. said of this book, that it was like "the peace of God, which passeth all understanding."

These works formed the two first parts of the plan, to which the author gave the name of *Instauratio Magna*; the first containing a distribution of the sciences, and the second unfolding a mode of procedure in the interpretation of nature. His plan embraced four other objects, for the accomplishment of which he had thrown together many detached hints under various titles. His third object was to prepare an arrangement of the phenomena of the universe, with a view to establish natural philosophy on the basis of observation and experiment. The execution of this object was attempted in his *Sylva Sylvarum*, a work of very indifferent merit. The fourth part of his labours, which he called *Scala Intellectus*, he intended to devote to a progressive series of inquiries, containing a detailed exemplification of his method in the various sciences. The fifth part, denominated *Prodromi, sive Anticipationes Philosophiæ Secundæ*, was intended as a temporary disposition of his materials till there was leisure to complete the whole structure, by the addition of the sixth part, which he called *Philosophia Secunda, sive Scientia Activa*, to which all the other steps were preparatory. This ultimate object of all his labours was to establish a system of philosophy on the severe and chaste principles of experimental research; but he had not the temerity to expect, that he would ever be able, personally, to conclude this arduous task.

What his lordship did accomplish was unquestionably a vast accession to the progress of the human mind; but his merit is probably overrated by many, who know little of the real value of his writings. The minds of men had been gradually preparing to cast off the yoke of authority. The revival of letters in the 15th century, the invention of printing, the reformation of religion, and various other causes, had introduced a freedom of discussion, over which the doctrines of the schools had little controul. Individuals had sprung up in different kingdoms, who had the hardihood to revolt from the dogmas of Aristotle; and others, who, by devoting themselves to experimental inquiries, had demonstrated the fallacy of many opinions hitherto deemed infallible. John of Salisbury, Grosthead bishop of Lincoln, Roger Bacon, Occam, Erasmus, Ludovicus Vives, Faber, and even Paracelsus, Montaigne, and Bruno, as well as Luther and his coadjutors, had taught men to question the decrees of the Lyceum, and to set at nought the thunders of the Vatican. Dr Gilbert had ascertained the laws of magnetic action, and furnished an admirable specimen of the inductive method. Copernicus had discovered the true theory of the planetary revolutions; a theory which Bacon impotently endeavoured to refute. Other eminent men, contemporary with Bacon, and unaided by his writings, particularly Galileo, Kepler, and Gassendi, were pursuing a course similar to that which he delineated, and acquiring immortal fame by improvements in geometry and physics, of which sciences he had scarcely learned the rudiments. It must not be disguised, that Bacon had never formed a fair estimate of the praise due to his predecessors and fellow-labourers. His *Censure of the more Eminent Philosophers* is expressed in the most acrimonious strain of scurrility. He was too ambitious of innovation, and too fond of paradox. In violation of his own rules, he often assumed facts without sufficiently scrutinising the evidence on which they rested, or sometimes without any examination at all; and very frequently, in his attempts to account for facts, he negligently acquiesced in hypothetical principles, which had obtained a popular currency. His distinctions are often perplexed, or indefinite, particularly with regard to physical and metaphysical science. His language also is destitute of precision, being extravagantly metaphorical, and also replete with unnatural conceits and obscure allusions. It is much more reprehensible than Aristotle's, which he has blamed for abounding with new words. Lord Bacon professes to retain the ancient terms, but to alter their uses; a practice which is apt to puzzle and mislead ordinary readers. With all these faults, and others on which it might seem invidious to dwell, Bacon must be allowed the merit of having bequeathed to the world a larger and more precious mass of sound logical instructions, deduced from his own reflections, than are to be found in the writings of all the authors who preceded him.

Of his English productions it is unnecessary to say much. His *Essays* have obtained a considerable share of popularity; but the observations contained in them, though frequently just and striking, are not always very consistent with one another. His speeches, law tracts, and historical or political papers, are heavy and uninteresting compositions, containing many specimens of bad taste and spurious wit, interspersed occasionally with useful and profound remarks. The treatise on the *Wisdom of the Ancients* is ingenious, but extremely whimsical and puerile. His *Apophthegms* are not of higher dignity than *Joe Miller's Jests;* indeed, the one book appears to be the prototype of the other. His *Letters* have neither ease nor dignity; and the greater part of them are full of teazing solicitations for preferment.

Lord Bacon professed a great veneration for religion. Some theological disquisitions, and sacred meditations, are found among his remains; and one of his prayers has, with little discrimination, been applauded by Addison as if it rivalled the devotion of an angel. His *Christian Paradoxes* are so extravagantly expressed, that Bolingbroke has adduced them as proofs of his insincerity rather than of the strength of his faith. But of all his devotional exercises, his versions of some of the Psalms are the most despicable. The following notable passage from the 104th Psalm, versified by the chancellor of England, the contemporary of Spenser and Shakespeare, cannot be matched by the sorriest rhymes of Hopkins and Sternhold:

> The fishes there far voyages do make,
> To divers shores their journey they do take;
> There hast thou set the great leviathan,
> That makes the seas to seeth like boiling pan.

With regard to his style, it is generally harsh and inelegant, evidently laboured with extreme care; often obscure or affected, but more frequently nervous and emphatic. His eloquence, according to Ben Jonson, was irresistibly impressive, and pleasing.

We now close our observations on the character and works of Bacon, a man, whose mind, indefatigably active, was capable of the mightiest efforts; whose powerful imagination suggested to him many original views; and whose literary ambition urged him to the bold attempt of demolishing the fabric reared by Aristotle, and rebuilding science on a more impregnable foundation. While the story of his public life affords a salutary memorial of the ravages effected by inordinate ambition, the perusal of his philosophical labours tends to abate the keenness of our scorn, and to mingle admiration and gratitude with the sympathies claimed by fallen greatness. We would earnestly recommend the *Novum Organum* to the attention of all speculative men, as one of the best means of facilitating and guiding their inquiries. From want of acquaintance with this excellent auxiliary, many ingenious men, in the present day, proceed empirically in their investigations, as if rules were altogether superfluous, or at least as if they were not aware that any code of rules exists preferable to the random suggestions of imagination.

The best edition of the treatise *De Augmentis* was published in 1623, under the author's inspection. A very accurate edition of the *Novum Organum* was published in 1620. The whole works of Lord Bacon were edited by Blackbourne, in four volumes folio, London, 1730; and by Mallet, London, 1740, also in four volumes folio. The most complete editions are one in five volumes quarto, London, 1778, and one in ten volumes octavo, London, 1803. There is a book in three volumes quarto, entitled, *The Philosophical Works of Lord Bacon, by Dr Shaw;* but its accuracy is not to be relied upon. Some other translations and abridgments appear to be still less correct. See Rawley and Mallet's *Life of Bacon.* Rushworth's *Historical Collections.* Voltaire *Melanges de Litterature. Journals of Parliament,* 1621. Birch's *Memoirs of Elizabeth.* (m. e.)

BACON, John, an eminent English sculptor, was born in the year 1740. His father, who was a clothworker in Southwark, was descended from an ancient family in Shropshire. Though, in the age of childhood, Bacon discovered a propensity for drawing, his first opportunity of exercising it was on becoming an apprentice at a porcelain manufactory, a the age of fifteen. There he was employed in painting china, and in forming small ornamental pieces i clay, which betrayed early indications of that geni which afterwards led him to such celebrity. Th sight of the models of different sculptors, sent to pottery near the manufactory to be burnt, excited great desire in Bacon to make something similar t them; and, in the year 1758, he formed a small figu of Peace, after the antique. In 1763 he first tri the sculpture of marble, without previously havin seen it attempted; and then he invented a useful i strument, since adopted by many others, for the pu pose of obtaining correct measurements and propo tions. The progress of this artist was so rapid, tha between the year 1763 and 1766, he obtained no le than nine different premiums from the Society fo Encouragement of the Arts. The Royal Academ being instituted in 1768, Bacon attended it, and re ceived what may be called his first instructions i sculpture, having never before seen either it or mo delling regularly executed. In the following yea the gold medal, the first ever given for sculpture b the Academy, was decreed to him. He was soo afterwards elected a member of the Academy; an his reputation was further established by a statue o Mars, which introduced him to the notice of th Archbishop of York. Bacon was now employ model a bust of the king; on which occasion, havin answered his majesty's question, whether he had ev been out of the kingdom, in the negative, "I am gl of it," said the king, "You will be the greater honour to it." The king was so well satisfied wit this performance, that he ordered Bacon to prepar another bust of him, intended as a present to the university of Gottingen, and the queen ordered a third.

By this time the reputation of Bacon as a sculptor and modeller was firmly established. In 177 after executing two statues, of Mars and Venus, plaster, he presented them to the Society for the E couragement of Arts: they were received with mu approbation, and the society voted him their g medal, inscribed Eminent Merit. He was n employed in many sculptures: He executed t groups for the top of Somerset House, in London 1780, and the monument of Lord Halifax in W minster Abbey. Next year he began the fam statue of Judge Blackstone, for All Souls Colle Oxford, and soon afterwards that of Henry VI., the Anti Chapel at Eton. He then finished w has been considered his *chef d'œuvre*, the monum of the Earl of Chatham in Westminster Abb which was commenced in 1778. His skill in antique had been frequently called in question, he modelled a head of Jupiter *Tonans*, which was spected by several eminent connoisseurs, and mi ken for an antique; some even inquired, "from w temple abroad he had obtained it?" Numerous pie of sculpture were produced from the chisel of Bac Lord Rodney's monument at Jamaica, Lord He field's at Buckland, near Plymouth, Mr Howar and Dr Johnson's in St Paul's Cathedral. This a ist was attacked by a disease, which quickly ter nated his existence, in 1799.

Bacon was certainly one of the most distinguis sculptors whom England has produced: There is an invention, a variety, and appropriate distribution of his characters, which proves that his conceptions were no less just than his execution. It was considered surprising, that one who had never studied abroad should be able to produce what the best stile of sculpture has seldom excelled; a fact which shews, that real genius, if duly fostered, will always soar paramount to mere imitation. In competitions with rival artists Bacon was remarkably successful: He failed only once in sixteen trials. Besides statuary, he is said to have turned his attention to poetical composition, and to have written on subjects connected with the arts. He also afforded materials and observations for treatises on sculpture. Simplicity of manners in domestic life, and piety, eminently characterised him. Though he had sculptured many splendid monuments for others, he ordered his own grave to be covered only with a plain stone, inscribed, *What I was as an artist seemed to me of some importance while I lived; but what I really was as a believer in Christ Jesus is the only thing of importance to me now.* See Cecil's *Life of Bacon. Gentleman's Magazine* 1799. Dallaway's *Anecdotes of the Arts in England.* (*c*)

BACOPA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

BACTRIA was a kingdom of Asia, which, in ancient times, appears to have been distinguished by the extent of its territories, the number of its inhabitants, and the magnitude of its exploits. But the glory which the Bactrians merited, by the wisdom of their councils, and the valour of their arms, has been obscured in the depths of remote antiquity; and the exalted station which their sages and heroes might hope to obtain on the page of history, has been occupied by the more fortunate candidates for fame which future ages have produced. Acquainted, as we are, with the uncertainty and contradiction of ancient annalists, it is with some hesitation that we attempt to mark the limits of this dynasty, which, being nearly the same with modern Chorasan, appears to have been separated, on the south, from India, by the lofty summits of the Paropamisus; on the west, from Margiana, by the hills which surround that province; on the north, from Sogdiana, by the river Oxus; and, on the east, from Asiatic Scythia, by a chain of mountains which rises as a barrier between the two countries. After employing some investigation, we imagine there are reasons for concluding, that this country was first peopled by the descendants of Gomar, the grandson of Noah, and that, for some time, they were called Chomarians, and their metropolis Chomara, appellations derived, with very little corruption, from the name of that patriarch. Afterwards Bactria became the capital of the kingdom; and, if we believe Q. Curtius, both the kingdom and its capital were denominated from the river Bactrus, which fertilized the fields through which it rolled, and washed the walls of that famous and almost impregnable city. But though we are inclined to follow Curtius, yet we are not ignorant, that the name of the river upon which Bactria was built, according to Pliny, was Zariaspa, and, according to Ptolemy, Dargidus. It will not, however, be impossible to reconcile the accounts of Curtius and Pliny, if what the latter affirms be allowed, that the ancient name of Bactria was Zariaspe, which is also affirmed by Strabo. In the same manner the river, upon which the city was built, may have also changed its name, or borne different names in different countries. Ptolemy's account, however, is inconsistent with both; for he places the city in the interior of the kingdom, while they assert, that it was situated at the foot of the Paropamisus, the southern boundary of the country. Bactria, in latter ages, was called Balk, a name which it bears at the present day.

Name and situation of its capital.

At what time Bactria assumed the name and the glory of an independent kingdom, it is impossible to determine. If we admit the authority of Ctesias, which we have more than questioned in our account of Assyria, it must have been at a very early period. According to him, Oxyartes filled the throne of Bactria when Ninus and his Assyrians endeavoured to reduce all Asia under their power *. But though the progress of that monarch, to the universal empire of the East, was long checked by the wisdom and valour of the Bactrians, yet the walls of this capital, and the spirit of its inhabitants, yielded at last to the repeated attacks of their numerous foes, and that kingdom became a province of the Assyrian empire. It is inconsistent with our plan to relate the various wars in which the Bactrians, as auxiliaries, engaged, while their governors were appointed by their conquerors. In this state of degrading dependency, Bactria remained, till the Assyrian empire was itself overturned by the aspiring spirit and the fortunate arms of Cyrus the Great. To conduct that consummate warrior at the head of the confederate forces of Media and Persia, till the ascendency of his genius extinguished the glories of the Lydian and the Assyrian empires on the field of battle, and levelled the walls of Babylon with the ground, belongs to the historian of these nations. But though the Bactrians might rejoice, that the kingdom which reduced them to bondage was thus reduced to the same humiliating dependency, yet, under the yoke of the

Subdued by Ninus,

and by Cyrus the Great. B. C. 539.

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* Justin, in the first book of his History, informs us, that Zoroaster was king of Bactria, when Ninus invaded that kingdom, (*illi* (Nino) *bellum cum Zoroastre rege Bactrianorum fuit.*) Before this assertion can be admitted, all the land-marks of ancient history must be removed. Yet such is the discernment of some writers, that this assertion has been believed. Euseb. *in Chron.* Diog. Laert. *in Proœmio.* The truth is, Zoroaster did not live till many ages after, as all the oriental writers assert, such as Abulfaragius, Ishmael, Abulfeda, Sharastani, &c. Ligerius, however, informs us, that in some ancient manuscripts of Justin, Oxyartes is found instead of Zoroaster, which, in all probability, was the true reading. Some ignorant transcriber may have changed the name, because he found in the text, that the king mentioned was said to have been the first inventor of magic arts, (*primus dicitur artes magicas invenisse,*) and as the invention of this science has been commonly attributed to Zoroaster, he might imagine that he was restoring or correcting the text of Justin, when he was corrupting it. We may easily perceive, that Oxyartes, if he ever existed, might have been addicted to these arts long before Zoroaster was born; for Zoroaster, though the great restorer of magic, was by no means its founder.

Persians, they were still doomed to wear the fetters which the Assyrians had first forged for them, and they soon found that they had changed their masters, but not their state. The names of the governors of Bactria, under Cyrus and his successors, are unworthy of a place in the page of history; and our attention is not drawn to the subject which we are treating till the time of Darius Hystaspes. During the reign of that monarch, according to the most authentic accounts, flourished Zoroaster, the great restorer of that religion which bears his name, and which has extended its influence, not only over Persia, but over almost all the East. After he had established his opinions in Media, where, as we shall narrate in our account of that kingdom, he first assumed the character of a divine teacher, he migrated into Bactria, and there propagated his opinions with singular success. It was in the capital of this country that he fixed his chief residence, and consecrated to the worship of fire that magnificent temple to which every true disciple was bound to make a pilgrimage, once in his life, to propitiate the deity which in a peculiar manner resided there. Having accomplished several journeys into the neighbouring nations for the propagation of his doctrines, he returned to Bactria, where, according to his own institutions, he was principally to reside, and endeavoured to convert Argasp, king of the Oriental Scythians, not so much by the force of reason, as by the dread of the arms of Darius. The indignation of that high spirited monarch was roused against a man who thus dared to insult his understanding and his power, and at the head of his native bands he invaded Bactria, slew Zoroaster, and the priests who adhered to him, and destroyed all the temples which he had consecrated. Had he returned to his own country in safety, his triumph would have been complete; but before he could reach his dominions, he was overtaken by Darius, and was doomed to behold his forces annihilated by the Persian arms. Darius immediately, by his example and authority, restored the temples, and confirmed the religion of Zoroaster in Bactria.

Zoroaster establishes his religion in Bactria.

Is slain by Argasp. B. C. 487.

Under the dominion of Persia, Bactria remained till the reign of Darius III. surnamed Codomannus. When that monarch beheld his mighty army dissipated, on the plains of Arbela, by the consummate skill of Alexander the Great, and the irresistible valour of his hardy veterans, he fled from the last and the most disastrous of his fields to Media, where, collecting the wrecks of his conquered forces, he resolved to make another effort to prop his falling fortunes. But when he heard that Alexander was advancing to give him battle, he shrunk from the unequal contest, and determined to retire into Bactria, to augment his army with the brave inhabitants of that province. Bessus, a Persian nobleman, to whom the government of that province was committed, was then in the army of Darius, at the head of the Bactrians, consisting of 4000 slingers, and 3000 horse. When he perceived that the spirit and the power of Darius yielded to the rising fortunes of the Macedonian hero, instead of supporting his lord and benefactor, he formed a conspiracy against him, and hoped to rise on his ruins to the empire of the East. No sooner did the Persian prince set out from Ecbatana, than, dead to gratitude and justice, and regardless of future fame, Bessus seized the person of the unfortunate monarch, and carried him to Bactria. Finding, however, that he was pursued by Alexander, with implacable resentment, he put Darius to death, assumed the sovereignty of the East, and collected an army to defend his throne. But, though to excuse his treason, and to advance his ambition, he had formerly condemned the flight of Darius, and imputed the misfortunes of that monarch to his pusillanimity, yet he now trembled at the approach of Alexander, imitated the most indefensible part of Darius's conduct, detroyed the country through which his enemies had to pass in pursuit of him, transported his army over the Oxus, and, after burning his vessels lest they should fall into the hands of Alexander, fled to Nautaca, a city of Sogdiana, where he imagined he would be secure. But neither the ravages of Bactria, nor the breadth of the Oxus, nor the bulwarks of Nautaca, could protect the usurper. Bessus was delivered into the hands of Alexander by his own officers when they could no longer defend him; and Alexander, detesting the traitor, though he reaped the harvest of his treachery, yielded him to the revenge of Oxatres, the brother of Darius, and the regicide expiated his crimes by a death embittered with every torture which ingenuity could invent, or cruelty execute.

Bessus governs Bactria.

• The conquered kingdoms, which formed the extensive empire of Alexander, were united only by the terror of his arms. At his death the chain was broken, and the chiefs, who governed the provinces by his authority, aspired at independence, and each claimed the sovereignty of his own state. Diodorus Siculus advances Philip to the throne of Bactria at that time; while Justin gives the sceptre to the hand of Amyntas. But the Bactrian prince, whatever was his name, was not long able to vindicate the fame and the freedom of his country. Seleucus, who had ascended the throne of Syria, having gained possession of Babylon, and subdued Media, carried his victorious arms into Bactria, and again reduced it [illegible] slavery. In this state of degradation the nation groaned till Antiochus Theos gave the government of the province into the hands of Theodotus, a [illegible] not more distinguished by the greatness of his ambition, and the magnitude of his designs, than [illegible] the wisdom and valour which he displayed in accomplishing them. Perceiving that his master was [illegible] gaged in a bloody war with Ptolemy Philadelphus, king of Egypt, and that all the resources of his kingdom were employed, he determined to shake off [illegible] allegiance, and vindicate the freedom of the country which he governed. We may reasonably conclude that, preparatory to the discovery of his great design, [illegible] employed his administration to establish the discipline and power of his army, to promote the cultivation and prosperity of his country, and to repair the fortifications of its cities. But we shall hesitate to believe, upon the authority of Justin, that the kingdom which Theodotus claimed could boast of [illegible] thousand cities; yet certainly whatever were the energies of that country, they were employed with singular ability by the illustrious usurper. His [illegible] ample was followed by many of the neighbouring states, which revolted from the power of Antiochus, and, deriving confidence and assistance, each from the success of the others, gained the liberty at which they aspired. The martial virtues, which enabled Theodotus to take possession of the kingdom, preserved it in his hand during the remainder of his life, and, at his death, placed the crown upon the head of his son.

This prince inherited the name as well as the domininions of his father. He began his administration by forming an alliance with Arsaces, who had wrested Parthia and Hyrcania from the Syrian yoke. But though, by this means, he secured himself from the attacks of Antiochus, and considerably extended the limits of his kingdom, yet he yielded to the superior abilities of Euthydemus, who aspired to the sovereignty of Bactria, and who, at the head of his bold and determined adherents, submitted his pretensions to the decision of the sword. Theodotus had the misfortune to behold the best blood of his army shed in his cause; and in order to save his life, but not his honour, he fled from the field of battle, and from his dominions, and his victorious rival ascended the throne. But though the wisdom which Euthydemus displayed might have bent his valour to endure, if not to enjoy, the tranquillity of peace; yet we may be assured, that his brave and aspiring spirit, equally formed for counsel and for action, was not displeased when the defence of his country again summoned him to the field of fame. Antiochus, having made peace with Parthia, was still indignant at the revolt of the Bactrians, and, with all the forces of his mighty empire, endeavoured once more to reduce them to subjection. But in a long and bloody war, which was chequered with various success, Euthydemus proved, that he was worthy of the crown, which he owed not to his birth, but to his ambition; and that all the efforts of Antiochus would be unable to wrest the sceptre from his hand. But as kings should resort to war only to procure peace, the moment when he understood that Antiochus despaired of success, he sent ambassadors to that monarch. Being admitted into his presence, the picture which they drew of the calamities of war, of the resources of their monarch, and, above all, of the designs of the Scythians, who were then rejoicing at their mutual destruction, and preparing a mighty army to overwhelm whichever of them should at last gain the ascendency, had such an effect upon the mind of Antiochus, that he immediately consented to a peace, which was confirmed by the marriage of the son of Euthydemus and his own daughter.

Demetrius.

Eucratides.

But the throne of Bactria, which was thus established, did not, at his death, descend to the son, but to the brother of Euthydemus. Menander, who, however, assumed the government in the name of his nephew, as soon as he had secured his authority, longed to signalize his reign on the field of battle, and, at the head of his forces, passed the river Hypanis, and extended the boundaries of his dominions, by subjugating the kingdom of Sigertis, the extensive province of Pattalena, and some other eastern countries. Proud of past victories, and meditating victories to come, he was arrested by the hand of death when just ready to invade Syria. So much was he beloved by his subjects, that the principal cities of Bactria were in arms to claim the honour of his sepulchre, and, to prevent a civil war, his ashes were divided amongst them, and the magnificent monuments which they raised, perpetuated the memory of his fame, and of their affection. Demetrius, the son of Euthydemus, then ascended the throne. The wisdom and vigour of his administration proved, that he was not unworthy of the sceptre which had been wielded by the martial talents of his uncle, and he not only secured the conquests of his predecessor, but added to them several new provinces, and raised his kingdom to the summit of prosperity. He left his dominions to his son Eucratides, who, pursuing the career of victory which his father had marked out for him, burst, with the whole force of his empire, through the barriers which nature seemed to have placed between his dominions and India, and kindled the flames of war in that country. The dangers which he encountered, and the defeats which he sustained, at the beginning of his enterprize, seemed to detract as much from the wisdom of his counsels, as they added to the fame of his valour; and it is difficult to determine, whether we ought more to blame the temerity of that prince, who could rashly expose himself, with only three hundred soldiers, in an enemy's country, to be besieged by an army of forty thousand men; or to admire the consummate skill, and the undaunted courage, by which he could not only extricate himself from such perilous circumstances, but obtain a victory over the besiegers. This victory was only the prelude of future conquest: many extensive provinces in the interior of India were subdued, and the glory of his exploits vindicated his claim to the proud appellation of *The Great King*, an appellation which the monarchs of Persia wished to arrogate to themselves, when exalted to the sublimity of empire. Returning to his paternal dominions, his son, who bore his name, and to whom he had committed the administration in his absence, conspired against his life, insultingly drove his chariot over the mangled body of his father, and inhumanly denied his remains the rites of sepulture.

Eucratides II.

Eucratides II. gained a kingdom by the murder of his father, but the vengeance of heaven pursued the parricide. While he was preparing to resist the Parthians, who were invading his dominions, a numerous and hardy band of barbarians, issuing from the inhospitable wilds of Scythia, passed the river Jaxartes, poured over the four kingdoms of Bactria with irresistible violence, rolled the forces of Eucratides before them, and expelled the monarch from his dominions. Collecting, however, another army, and endeavouring to rouse his countrymen to assert their liberty, Eucratides returned to the doubtful contest; but, on the field of battle, where he lost his life, the glories of his country were finally extinguished, and Bactria was precipitated into slavery, from which it has not emerged to the present day. The power of Scythia, under which Bactria groaned for ages, was at last broken by the Huns; but as this warlike people conquered that unhappy country for themselves, and not to exalt it to its former rank amongst the nations of Asia, that revolution does not fall within the range of our rapid narrative.

People, government, religion, &c.

By Herodotus, and other ancient annalists, we are informed, that the Bactrians were well made, vigorous and healthy; admirably adapted for supporting the fatigues and dangers of war, by the habitual temperance which they cultivated, and by that restless activity which disdained repose. Their soldiers were deservedly famous for the skill which they displayed in the use of the sling and the bow, with which they levelled the ranks of the enemy at a great distance. As they drew near to battle, they employed short darts, till joining man to man, the slaughter which they made with the sword, or with a large dagger that hung from their girdles, evinced that the strength of their arm, and the valour of their soul; were equally formed for close combat. Their government was monarchical, hereditary, and despotic. Their religion was idolatrous; for though they held the opinion of one Supreme God, yet the adoration which they payed to the sun, and to fire, even after Zoroaster had reformed their theology, will warrant this conclusion. We shall not have a very exalted idea of their morality, when we are informed, that incontinence was not accounted a blemish even in the female character, that incest was permitted, and that the finer feelings, which dignify human nature, and are the source of the purest pleasures of our existence, were so completely eradicated from their hearts, that they trained fierce mastiffs to devour their aged parents, when they could no longer support themselves, and which, from that horrid employment, were emphatically denominated *Sepulchral dogs*. Their learning, however, during the latter period of the state, appears to have been considerable; and it is, perhaps, more than a conjecture, that from this country the rays of science first dawned upon the Hindoos. During the same time, they seem to have cultivated commerce to a great extent with the various nations of India. They wore tiaras, tunics, and breeches, like the Medes.

Description of the country.

Perhaps no country of the same extent ever discovered a greater variety of soil than Bactria. The northern provinces, which extended along the banks of the river Oxus, were intersected with many streams and fountains, which adorned and fertilized the fields. The ancient topographers of this country, whose account is confirmed by Sir John Chardin, inform us, that there is a fountain in Bactria, whose waters are so plesant to the taste of the musalinan, or albemec, a fowl about the size of a hen, and of a black and red colour, that it attracts it to its streams from a great distance. As this fowl is gregarious, and feeds upon locusts, whenever these insects settle upon any field in such numbers as to endanger the crop, the inhabitants convey the water of this fountain in vessels to the place, and the flocks of musalinans, which are immediately drawn thither, deliver the country from the locusts. Bactria could boast of many extensive plantations; vines, and other fruit-trees, were in great abundance, and the crops which they produced were not only liberal, but of an exquisite taste and flavour. That species of tree which produced manna of a yellowish colour and of a large size, and
which was allowed to be the most valuable, grew t
greater perfection there than in any other country
The fields were equally well adapted for every spe
cies of grain; and the flocks and herds which range
their pastures were all excellent in their kind. Th
goats of this country are said to have produced th
best kind of bezoar, a stony substance which i
formed within the animal, and is so famous in the a
nals of medicine. The southern regions of thi
country, however, being in a great measure destitut
of water, and covered with sand, are equally remark
able for their sterility. The whirlwinds, which wit
irresistible violence sweep along the surface, not onl
blot out every vestige of the roads which lead throug
these regions, and bury the unhappy travellers wit
the clouds of sand which they roll before them, bu
with their continued eddies raise lofty mountains o
the plains. Travellers, whom necessity compels t
traverse these pathless wastes, generally journey b
night, which from the brightness of the sky resem
bles day, and direct their course by the stars as i
they were at sea. See *Apollodorus*. *Plin*. l. vi. c. 15
16. *Q. Curt*. l. vii. *Strab*. l. xi. xv. *Ammian. Mar
cel*. l. xxiii. *Arrian*. *Syncel*. *Justin*. l. i. xli. *Diod
Sicul*. Euseb. *in Chron*. Prideaux's *Connect*. v. i.
and iii. *Univ. Hist*. v. iii. Pezron *Antiq. of Nat*
Wise *Hist. of Fab. Ages*. Bryant *Anal. Mythol*. (x)

BACTRIS, a genus of plants of the class Mo-
cia, and order Hexandria. See BOTANY. (w)

BADAJOZ, the *Pax Augusta* of the Romans, is
the capital of Spanish Estremadura. The town was
formerly situated on the high ground where the cas-
tle now stands, and the splendour and extent of its
buildings are still apparent in the deserted churches,
and in the remains of Roman, Gothic, and Moorish
architecture, which mark its ancient site. The mo-
dern town is situated on the lower ground, and ex-
tends into a beautiful plain on the banks of the Gua-
diana. The cathedral is the only public edifice de-
serving of notice, and some of the chapels are adorned
with excellent paintings. The town has five gates
and the streets are narrow and irregular. Withou
the gate of Las Palmas there is a fine bridge over th
Guadiana, built in 1596, and containing 28 arche
the largest of which has a span of 78 feet, and th
smallest of 20. The length of the bridge is 18
feet, and its breadth 20.

Being one of the frontier towns of Spain, and ne
ly about a league and a half from Portugal, Badaj
is defended by strong fortifications, and by the c
tles of Christobal and Las Pardaleras. It was co
quered by the Goths in the fifth, and by the Mo
in the eighth century, and has undergone numer
sieges in subsequent wars.

Badajoz is the residence of a captain-general
intendant of the province of Estremadura, of a mi
tary and civil governor, a military governor of t
castle of Christobal, an Alcalde mayor for administ
ing justice, and a principal contador of war. It h
also an arsenal called La Maestranza, which contai
all kinds of arms and military engines.

Badajoz is the seat of a bishop, suffragan of th
metropolis of San Jago; and there are in the tow
five parish churches, seven monasteries, five nunne
ries, and five hospitals.

manufactory in this city is one of hats,
stablished a few years ago by a French-
ulation 14,500. West Long. 6° 43′,
38° 44′. See Laborde's *View of Spain*,
; and Semple's *Second Journey in Spain*,

, a margravate of Germany, in the circle
ituated on the eastern bank of the Rhine.
nds the territory which lies between the
and Swarzback, and is watered by the
urm, the Nagoed, and several other tri-
ms of the Rhine. It is divided into two
which were formerly named the marqui-
n-Baden, and marquisate of Baden Dur-
since the union of these states under
they are merely distinguished by the
he Upper and the Lower marquisate.
marquisate, of which Baden is the capi-
hends the northern part of this country,
ween the rivers Pfinz and Alb; all the
included in the Lower marquisate, the
which is Durlach. Besides these two
incipal towns are in Upper Baden, Ras-
ffer, Steinbach, and Etlingen; and, in
n, Carlscruh, Pforzein, Muhlburg, and

try of Baden is fertile and beautiful.
re shaded by forests of excellent wood;
ve with luxuriant crops of corn, hemp,
y; while its orchards abound with the
of fruit; and rich clusters of grapes are
from its vines. Numerous herds of deer
g the woods and mountains, which are
quented by large flocks of wild fowl.
rs, irrigated by the Rhine, pasture great
horses and black cattle; the hogs, fed
ts, furnish bacon of a delicious flavour;
fisheries are established on the islands of
The mines of Oberweilli and Cande-
excellent iron; and quarries of free-stone,
kinds of marble, are also found in this
well as agates, which the inhabitants po-
ort in considerable quantities. Manu-
much encouraged in Baden, and are in a
ing condition. Among others, there is
a manufacture of that kind of varnished
ch is called Fayenza, from a town in
it was first invented. The margrave has
t the same place, a few years ago, a fine
of clock-work, of which a particular
vill be given under the article Durlach.
rave of Baden is a sovereign prince, and
es in the college of princes; one for
n, and the other for the margravate of
which is situated along the Brisgaw.
es are said to be 832 square miles in ex-
contain 200,000 inhabitants. His whole
ounts to 1,200,000 florins, or about
terling; but as the reigning prince has
d for many years in improving his finan-
ing arbitrary imposts, and substituting in
regular land tax, his revenue will, with-
e considerably increased. The military
t of Baden consists of 3000 men, 300 of
avalry. The reigning prince, and his

Baden.

subjects in general, are Lutherans; but other sects are tolerated. (μ)

BADEN, the capital of the Upper marquisate of that name, is situated on the river Oelbach, at the foot of a mountain covered with vineyards, near the Black Forest. It is celebrated for its hot baths: they are supplied by boiling water issuing from twelve springs, which the inhabitants convey by subterraneous pipes to almost every house. N. Lat. 48° 46′, E. Long. 9° 24′. (μ)

BADEN, a small town in the archduchy of Austria, seated on the river Schwocha, and much frequented on account of its baths. N. Lat. 48° 3′, E. Long. 16° 12′. (μ)

BADEN, a county of Swisserland, lying on both sides of the river Limat. It is bounded on the north by the Rhine; on the east by the canton of Zurich; on the south by the Reuss; and on the west by the Aar and the canton of Bern. This county is fertile in corn and fruits, and vines grow in some places along the banks of the Limat. Its extent is about 138 geographical square miles, it has three large towns, a borough, and several villages, and contains about 24,000 inhabitants. About the 10th century, Baden was incorporated in the German empire; and, after being successively subject to the dukes of Zœringen, the counts of Kyburgh, and Rodolph of Hapsburg, the canton of Zurich obtained possession of it in the year 1418, and made it a bailliage of the eight ancient cantons, Lucern, Uri, Schweitz, Underwalden, Zug, Bern, Uri, and Zurich. Thus it continued, till the civil war broke out between the Protestants and Catholic cantons, (A. D. 1712.) It was then seized by the troops of Zuric and Bern, and at the peace of Araw, was ceded to those two cantons and Glarus, which, having remained neuter, preserved its right of joint sovereignty. Till this time the diet had always assembled at Baden, but it has since been transferred to Frauenfield. The three cantons alternately appointed a bailiff, who resided in the castle of Baden, the capital. The inhabitants enjoy the right of electing their own magistrates, and have their own judicial courts. In civil proceedings an appeal lies to the bailiff, and from his decision to the syndicate, composed of the deputies of the three cantons, and, in the last resort, to the cantons themselves. In penal causes the criminal court condemns, and the bailiff has power to pardon, or to mitigate the offence. By a decree of the French government in 1801, Argovie, united with Baden, and the upper part of the Frickthal, was made one of the 17 departments, or cantons of Swisserland, from which 6 representatives were to be deputed to the diet. (μ)

BADEN, the capital of the above canton, stands on the bank of the Limat, which there flows through a plain flanked by two hills. Its hot baths, from which it derives its name, are much frequented, and were famous even in the time of the Romans, by whom they were called *Aquæ*, or *Thermæ Helveticæ*. Baden was originally a Roman fortress, erected for the purpose of checking the Germans; and still retains many monuments of Roman antiquity, such as alabaster statues of several heathen gods, bronze coins, and medals of the emperors, made of gold, silver, copper, and bronze. There is a stone pillar too, erected in honour of the emperor Trajan, who paved in this country a road eighty-five Italian miles long. The baths are about a quarter of a league distant from the city, and their waters, which are mixed with sulphur and alum, are conveyed to the houses by means of pipes. N. Lat. 47° 21′, E. Long. 8° 12′. (*u*)

BADENOCH, a district in the county of Inverness in Scotland. See INVERNESS-SHIRE.

BADGER. See *Ursus*, under MAMMALIA.

BADINAGE, the name given in France to a method of hunting wild ducks, practised in some parts of that country, and which M. Gerardin, one of the authors of the *Dictionnaire des Sciences Naturelles*, describes as very amusing. The sportsmen provide one or more boats, which they cover with green boughs, or green reeds, and row, as silently as possible, along the pond, or lake, which the ducks frequent. They have also a little dog, trained to the sport, whom, as they approach the ducks, they slip unobserved into the water. The ducks, who were dispersed here and there on the surface of the water, no sooner perceive this unexpected intruder, than they collect themselves together, and endeavour to escape to another part of the lake. Pursued by the dog, and attracted by the appearance of the green boughs, or reeds, they swim for refuge to these insidious islands. The sport now begins; for the hunters, anticipating the success of their purveyor's assiduity, are prepared to slaughter the poor birds, either singly, by means of a kind of spear, or in dozens, by discharging among them a volley of large shot from a blunderbuss, or other gun of large calibre. This comprehensive execution by the gun will not, it seems, succeed oftener than once in a season, as the noise makes such an impression on the ducks, that they remember the effects, and ever after avoid a similar decoy. (*f*)

BÆTOEN, a serpent described by Forskal in his *Fauna Arabica*, whose bite proves almost instantaneously mortal, and produces an universal swelling of the whole body. The characters of this formidable animal are not sufficiently marked to fix its place in a systematic arrangement, little more being known of it, than that it is freckled with black and white spots. (*f*)

BÆCKIA, a genus of plants of the class Octandria, and order Monogynia. See BOTANY. (*w*)

BÆOBOTRYS, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

BÆTICA, the name of one of the ancient provinces of Spain, comprehending modern Andalusia and Grenada, taken from the river Bætis, now the Guadalquivir. (*j*)

BAFFIN'S BAY, a large bay lying between North America and Greenland, which derives its name from William Baffin, who endeavoured, in 1616, to discover a passage through Davis' Straits. Its limits have not yet been ascertained by any accurate observations. See Crantz's *History of Greenland*. (*j*)

BAGAUDÆ, the name of a band of turbulent peasants, who frequently disturbed the tranquillity of the Roman empire. See Crevier's *Histor*
Roman Empire, vol. ix. p. 282. (*j*)

BAGDAD, a city of Turkey in Asia, a
tal of the Pachalek of Bagdad, and of the Bal
or Arabian Irac, is situated on the banks
river Tigris, in N. Lat. 33° 22′, E. Long.
and was founded by the Caliph Abu Jaafar
sor, in the 145th year of the Hegira, A. D.
has been very erroneously supposed to occ
same spot on which ancient Babylon formerl
and the mistake may have originated, from
cumstance of its being built upon the scite o
cia, which was frequently styled New Babyl
the old city of that name stood upon the b
the Euphrates, about 50 miles farther up t
Bagdad is indeed the last of a succession of
ficent cities, which were built at different p
the same extensive plain, and each of wh
raised from the ruins of its predecessor.
was exhausted of its inhabitants and its orna
the city Seleucia; Seleucia, again, was suppl
Ctesiphon; which, in its turn, yielded to A
eh; and, last of all, Bagdad supplied a resi
the sovereigns of the East.

Almansor, the second caliph of the famil
Abassides, having disgusted, by his cruelties
habitants of Hasomia, where he usually resid
having thus given occasion to insurrections
his government, as well as conspiracies ag
life; he resolved to abandon a place, which
determined in its disaffection, and to remove
of the empire to a city founded by himsel
following account is given by the Persian w
the foundation of the new city, and the o
its name. Khosru, named Amishirwan, ha
the plain on which it stands to one of hi
who built and dedicated there a chapel or
to her favourite idol Bagh; and from this
stance the whole of the neighbouring dist
called Baghdad, *i. e.* in the Persian languag
gift of Bagh." This little temple, in pr
time, served as a place of retreat to a hermit
traordinary sanctity, who happened to me
Almansor, while he was riding on the bank
Tigris, and meditating on his new scheme; a
upon learning from one of the attendants the
of the caliph, mentioned an ancient tradition,
city was to be built in that place by a person
Moclas. Almansor having been informed
hermit's observation, declared to his officers,
name of Moclas had been given to him by hi
gave thanks to God for having destined hi
the author of so great a work; and instant
upon the spot where he stood, as the situatio
intended capital.

According to the Arabian authors, howeve
was none of these marvellous and romantic
rences in the caliph's proceedings. The gro
deliberately chosen near the confluence of
phrates and the Tigris, as being a favourab
tion, both for the defence of the city, and
conveyance of provisions; and it was called B
i. e. the garden of Dad, because a Christia
of the name of Dad, had been residing on
where it was built.

part of the city was situated on the west-
the Tigris; and was of a circular form,
liph's palace and the great mosque in the
ile the buildings on the eastern side were
lmansor detached a body of troops, under
Mohdi, to protect the workmen from the
he Persians; and the young prince ha-
d, with a wall, the place on which he
that part of the city was afterwards
Camp or Fortress of Al Mohdi." The
palace in the eastern as well as in the
sion of the city, both of which had the
of "the House of the Caliphat;" but
eastern bank was the most magnificent,
ed, by way of eminence, "the Garrison,"
al Inclosure." It was surrounded, on the
y a semicircular wall, with six gates, the
ich was called "the Gate of the Præ-
its entrance was generally kissed by the
mbassadors, who came to the court of
The city was completed in the 149th
Hegira, A. D. 766; and received the
dinat al Salam, "the city of peace," al-
r to the name of Jerusalem, or to the
prevailed throughout the empire at the
t was finished, or to the name which was
pplied by the Orientals to the river
Vadi Assalam, "the torrent of peace."
er was the reason of this appellation, it
y adopted by the neighbouring nations;
he city of Bagdad is often called by the
nopolis, which is equivalent to the Arabic,
Salam. The city, when completed, was
r form, inclosed with a double wall, and
a considerable number of towers. Its
disposed in such a manner, that those of
l were in a sloping or oblique direction
t to those of the second; and from this
e, it was sometimes called by the Ara-
, *i. e.* "the crooked." In the centre of
as the castle, or citadel, which command-
rt of the town; and a bridge was con-
r the Tigris, to facilitate the communi-
een the two divisions of the city. Bag-
ch enlarged and beautified by succeeding
t particularly by Mostanser Billa, who
re the famous college, which the Arabs
Madrasah Al Mostanseriah; and which
ble for the elegance of its structure, the
its revenues, and the number of its stu-
ontained also several other well endowed
s renowned for the elegance of the Ara-
within its walls; and produced a greater
earned men, than any other place in the
n dominions, except Mecca and Me-

of Bagdad continued to be the seat of
of the house of Abbas, and the capital of
empire, for the space of more than 500
ring this long period it sustained several
ges, and was the scene of many a bloody
In the 197th year of the Hegira, A. D.
attacked by Al Mamon, the second son
Al Raschid, who had rebelled against his
r Al Amin; and by a siege of twelve
months, almost the whole eastern part of the city was laid in ruins. In the 334th of the Hegira, A. D. 945, it was afflicted by so severe a famine, that many persons were punished for feeding upon the flesh of children; and this dreadful scarcity was followed by pestilence, which swept away great numbers of the inhabitants. In the 417th of the Hegira, A. D. 1026, it was besieged by a numerous army of Turks, who plundered, and set it on fire; by which means the best part of the city was consumed, and the inhabitants reduced to a state of extreme poverty. In the 447th of the Hegira, A. D. 1055, it was pillaged by the troops of Trogrud, or Togrol Beck, who assumed to himself the office of Emir-al-omra, and made great encroachments upon the power of the caliphs. At length, in the 656th of the Hegira, A. D. 1258, Bagdad was taken by Hulaku, or Hulagou, the grandson of Zengis, the Mogul, or Tartar; its reigning prince, Al Mostasom Billah, put to death; the caliphate itself abolished; and the city given up to pillage and massacre for the space of seven days. It remained in the possession of the Tartars or Moguls till the year of the Hegira 796, A. D. 1393, when it was taken by Timur Beg, or Tamerlane the Great, from Sultan Ahmed Ebn Weis, who abandoned his capital to the conqueror, and took refuge in the territories of the Greek Emperor; but who found means to regain the city in a short time, and to keep possession till the 803d of the Hegira, A. D. 1400. It was then attacked a second time by Timur, and vigorously defended by Ahmed's governor Farruj. At the end of forty days, however, it was taken by assault, the inhabitants barbarously massacred, and the principal building levelled with the ground. From this period, it was alternately in the hands of Sultan Ahmed, of Abubekr, grandson of Tamerlane, and of Kara Yusef the Turkoman, till the year of the Hegira 815th, A. D. 1412, when it was completely secured by the last mentioned prince, and remained in the possession of his descendants, till the year of the Hegira 875th, A. D. 1470. It was then occupied by Usun Cassan, in whose family it continued till the 916th of the Hegira, A. D. 1510, when it was taken by Shah Ismael, surnamed Sofi; and, for 120 years after, it was the object of perpetual contest between the Turks and Persians. In the year of the Hegira 1048th, A. D. 1638, it was besieged by Amurath, or Morad IV.; and though the Persian garrison, after a brave resistance, had procured an honourable capitulation, they were treacherously massacred, and the town given up to pillage by the cruel conqueror.

Present state.

From this period Bagdad has greatly declined in extent and magnificence; but is still a place of great concourse, of considerable trade, and of more wealth than any other city in the world of the same size. It is the resort of great numbers of traders and travellers, who pass into Persia from Natolia, Syria, Palestine, and Egypt. It is visited from a principle of religion, by multitudes of devout Mussulmen, who imagine that Ali once resided in the city. All the pilgrims also who go to Mecca by land, must pass through Bagdad, and pay to the Basha a kind of tax or toll, of four piastres. The professed religion is the Mahommedan; but the greater part of the peo-

Bagdad.

ple are called Rahedis, a sect of heretics, who are peculiarly strict in separating themselves from persons of a different religious persuasion, and who would not drink out of the same cup with a Christian, or a Jew, and scarcely even with an orthodox Mahomedan. Various sects of Christians, however, are tolerated in the city, of which the Nestorians are the most numerous. There are several Jews, who are confined to a remote quarter of the town. They are hated and continually insulted by the Turks, and live here, as in most other places, in a state of political degradation and oppression. Many also repair hither annually to visit the sepulchre of the prophet Ezekiel, which they suppose to be in the neighbourhood of the city.

The inhabitants of Bagdad are composed of Persians, Armenians, Turks, Arabs, and Jews; but their number has been estimated very variously at different times by different travellers. By Tavernier, in 1652, they were supposed not to exceed 15,000; and by an officer of the East India Company, in 1779, they were computed at 100,000. They are not, however, the vile slaves we imagine them, and which we consider as the invariable consequence of a despotic government; but are, on the contrary, proud, enterprising, active, and inclined to mutiny. The higher classes are civil and generous, and obliging to strangers, whom they always treat with regard and distinction. It is true the lower classes are the same as in all the other cities of Turkey, ignorant, rude, full of superstition and insolence, and enervated by debauchery and idleness.

The form and fortifications of the city seem to have undergone little alteration; and the different descriptions which have been given of its appearance during the last 150 years are very much the same. It looks, at a distance, like a grove of trees; and stands in the midst of a very fertile soil, which is left almost entirely destitute of cultivation, but which nevertheless produces all the European fruits and vegetables in their proper seasons, and in the greatest perfection. The city is in the form of an irregular oblong square, about 1500 paces long, 800 broad, and not above three miles in circuit. The walls are built with brick, terrassed in several places on the top, strengthened with large towers like bastions, mounted with 60 pieces of cannon, of which the largest are five or six pounders, and surrounded by a wide ditch, about five or six fathoms in depth; but these fortifications are very much broken down in several places, and the ordnance in such a decayed state, as to be scarcely fit for service. There are four gates, one of which is on the side of the river; and the entrance to the city in that quarter is by a bridge of boats, or rather pieces of timber fastened upon goat skins, which are blown like bladders. Near to one of these gates, on the north side, stands the castle or citadel, which has the command of the river, and which is planted with a number of cannon, but is not capable of very much resistance. Some of the public buildings, the mosques, minarets, hummums, and the palace of the bashaw's lady, are built of hewn stone, and make a handsome appearance; but there are neither public schools, nor public libraries. The bazars, or markets, are very extensive, protected by arches from the excessive heat of the sun, divided into differe
and filled with shops to the number of
which all kinds of merchandize are to b
There are also to be seen the remains of
cient edifices, of lofty structure and beauti
manship; especially a large khan, suppose
been built about 850 years ago, and of
bricks appear as fresh as if they had been ne
"The houses," says a late traveller, "are
large, built of brick and cement, and arch
many of the windows are made of elegant
glass; the ceilings are mostly ornamente
kind of chequered work, which has generall
appearance; most of the houses have a c
before them, in the middle of which is a l
tation of orange trees, &c. that has a very
effect." (*Journey from Bassora to Bagdad*
p. 46.) In the months of June, July, and
(we are informed by the same traveller, as
Tavernier,) the weather is so extremely hot
inhabitants are obliged to live in subterrane
ments, or at least to sleep upon the terrasse
houses. The Samiel rages here from the
of July to the middle of August, but is
such a pestilential quality, nor followed by
tal accidents which often attend it in th
(See ARABIA, vol. ii. p. 275.) The wome
dad are very richly habited; and are loa
jewels and rings, both at their ears and no
cept they be very poor, they never go ou
horseback; and on these occasions, it is
courtezans are distinguished by putting thei
to the stirrups, while others use only the le

The city is governed by a Pacha of th
who assumes also the title of caliph, from
having been the ancient residence of the
pontiffs. He exercises an authority almost
independent of the Porte, and is looked up
most powerful vizier in the Ottoman empi
present governor *Ali*, is a native of Georg
from being the slave of Soliman Pacha, be
son-in-law, and successor; and it is wort
mark, that for nearly a century past, almo
Pachas of Bagdad have been Georgian re
whom intrigues and good fortune have dra
the horrors of slavery, to conduct them to
nours of unlimited power. In the time of T
the forces of Bagdad consisted of about 20
of different descriptions, within the walls; a
3000 or 4000 cavalry in the suburbs and ne
ing towns. But, at present, these can be
to more than 30,000, as many cavalry as
The cavalry, particularly those of Kurdi
armed with a pistol, a lance, and a sabre, a
times also with a carabine. The Arab
however, use only the lance; and the infan
a sabre and musket. Ali Pacha has, bes
foot disciplined after the European fashion
can carry into the field 30 pieces of cannon
skilful soldiers. His army, however, is w
paid, and ill treated, so that it is compos
of the refuse of the populace. The civil g
is executed by a cadi, who acts in all capa
discharges at once the offices of judge,
tofterdar, or treasurer for the grand signio

The revenues, which are drawn chiefly from the customs, the annual contributions of governors and intendants of cities, and the tribute of the Arab tribes, which are dependant upon the government of Bagdad, may be computed at seven millions and a half of piastres, or £337,500 sterling. This would be considerably increased, were not the Kurdes (inhabitants of Kurdistan) exempted from all fixed contributions, on account of their eminent services in the field, and the frequent campaigns they are obliged to make; and were not the products of the city of Bassura, so impoverished by the ruin of its commerce, that they are scarcely adequate to defray the expense which it demands for its defence. But even this sum is seldom fully collected, on account of the slothfulness of the Turks, who often suffer themselves to be plundered by the Arabs.

In the reign of Soliman Pacha, Bagdad was the centre of a rich and extensive commerce; but many obstacles have since arisen, which have paralysed the exertions, and almost destroyed the activity of its merchants. The dangerous navigation of the Mediterranean, occasioned by the war between Britain and France; the intestine disorders of Persia; the monopoly of Indian produce by the English; the frequent excursions and robberies of the Wahabees; the continual discord which reigns in Turkey, and the unprotected state of agriculture and industry in that empire, are the principal causes which have led to the present derangement of the commercial affairs of this city. Notwithstanding, however, these obstructions, and the comparative inferiority of Bagdad to its former opulence as a place of trade, it may still be considered as the great emporium of the East. The productions of Arabia, India, and Persia, are landed at Bassora, from which they are carried in large boats, that ascend the Tigris or Euphrates to Bagdad, where they find a ready market, and from thence are spread over the other cities of Turkey. Europe furnishes it with merchandize of every description, as also with the productions of America. Muslins, rich silks, and cotton stuffs, are brought from Coromandel; indigo from Bengal; shawls and aromatics from Cashemire; sugar from Java; cloves from the Moluccas; and pepper from the coast of Malabar. In return for these it has nothing of its own to offer; and except dates, tobacco, and a small quantity of woollen stuffs, which are its only exports, the trade of Bagdad consists entirely in the distribution and exchange of foreign commodities. According to a late traveller, "the commerce of this city suffers also greatly from the oppression and cruelty of the Pachas, who are continually extorting money from the poor inhabitants; and none suffer more than the unfortunate Jews and Christians, many of whom are put to the most cruel tortures, in order to force their property from them. This series of tyranny has almost entirely driven them out of the city, in consequence of which the trade must suffer considerably, they being generally the principal merchants in the place. Were the city mildly governed, it is so well situated for traffic, that it certainly would be the residence of a number of Christian merchants, which would make it one of the richest and most flourishing places in the world." *Journal of a Journey from Bassora to Bagdad*, in 1779. See also *Mod. Un. Hist.* vol. ii. p. 277, 284, 387; vol. iii. p. 19, 192; vol. v. p. 156, 336, 422. Mignot's *Hist. of the Ottoman Empire*, vol. i. p. 53, 61; vol. iii. p. 65. Prideaux's *Connections*, vol. i. p. 571. Gibbon's *Hist.* chap. 52, 64. Tavernier's *Persian Travels*, b. ii. c. 7; Jackson's *Journey from India to England*, in 1797; and *Description du Pachalik de Bagdad*, Paris, 1809. (*q*)

BAGLAFECHT, in Zoology, a variety of the *Loxia Philippiana*, or Philippine grosbeak, found in Abyssinia, and distinguished from this latter bird by having the tail and quill feathers of a greenish brown, edged with yellow. The *baglafecht*, like another species of this tribe, (See ORNITHOLOGY,) displays admirable care and instinctive foresight in the construction and position of its nest, which it builds of a spiral form, somewhat like the shell of the *nautilus*, with the entrance below, and suspends at the very extremity of a slender twig, so as to turn with the gentlest breeze, and be out of the reach of predacious animals. See Buffon, *Histoire Naturelle des Oiseaux*; and *Dictionnaire des Sciences Naturelles*, tom. iii. (*f*)

BAGLANA, or BAGLANEH, a mountainous but fertile province of the Mogul empire, defended by no fewer than nine strong fortresses, built on the summits of lofty rocks. It was long an independent province, and its revenue before the Mogul conquest was £80,000. See Rennel's *Memoir*, p. 259. (π)

BAGPIPE, the ασκαυλος of the Greeks, and the *Tibia utricularis* of the Romans, is a well known musical instrument, which has erroneously been supposed peculiar to Scotland and Ireland. The ancients, both Greeks and Romans, however, were acquainted with it; and in many countries it is a favourite and popular instrument at this day.

The bagpipe, as constructed at the present period, consists of a large leather bag, inflated by the mouth, or by means of bellows. Connected to it is a flute part, or chaunter as it is called, into which is inserted a reed, and the action of the air from the bag on this reed produces the music. The chaunter is perforated with holes like a common flute, for the different notes. The other parts are three drones, also consisting of reeds and tubes, two of which are in unison with D, on the chaunter, or the first note of the German flute, and the third, or long drone, is an octave lower.

The bagpipe is an extremely defective and imperfect instrument in all its different kinds, of which there are four. First, The Irish or soft pipe, in which the chaunter takes a range of ten or twelve notes with tolerable precision, and which is always played with bellows: the reeds are softer, and the tubes longer, whence the Irish pipe is more suitable for performance in an apartment. An improvement has been attempted, by adapting three or four keys like flute keys on one of the drones; by pressing one of these with the arm, a third or fifth to the note of the chaunter is produced, which forms an intermediate chord with the drone, and has a pleasing effect. The second kind of this instrument is the Scottish or Highland bagpipe, which is played either with the mouth or with bellows, like the Irish pipe; and excepting that, as far as we know, keys have never

Bagpipe.

been adapted to it, is almost the same in every respect. The principal difference consists in the reeds being constructed to produce a louder sound, and the drones are shorter. Third, The small, or Northumbrian bagpipe, which is the Scottish bagpipe in miniature. Properly speaking, the Scottish bagpipe has but eight or nine good notes: one or two more may be gained by what pipers technically call pinching, that is, half covering the thumb hole, which sometimes is attended with the most disagreeable tones. Nothing is so well adapted for the bagpipe as tunes consisting of few notes, and all set on the same key; for its compass is really very limited, and by no means of that extent of which most performers endeavour to persuade themselves. From the limited compass of the instrument, and its imperfections, we find but little music written for it; to which may be added another reason, that those in general who can play cannot write. The favourite and peculiar music is the Highland Pibrach, which we confess has always appeared to us utterly unintelligible. It is supposed to be a battle piece, a march, a lamentation, or the like; and sometimes occupies a complete half hour or more in performance.

Of the progressive history and improvement of the bagpipe to its present state, we know very little. It is supposed that there are allusions to an instrument of similar construction in sacred writ; and there is no doubt that it is the origin of the organ. Perhaps it first consisted of an inflated bag alone, with the pipe and reed; and in such a form it seems to have been used by the Greeks, and also at a later period by less civilized nations. By the Romans it was called *tibia utricularia*, and, as certain authors have conceived, *chorus*, or *choraulus*, and it was probably played in the same way as the modern Highlanders play it.

Et cum multifori tonius cui tibia buxo
Tandem post epulas et pocula multicolorem
Ventriculum sumpsit, buccasque inflare rubentes
Incipiens oculos aperit, ciliisque levatis
Multotiësque alto flatu e pulmonibus hausto
Utrem implet, cubito vocem dat tibia presso
Nunc huc nunc illuc digito saliente.

VIRGIL.

Suetonius speaks of the bagpipe; and it appears that Nero, the Roman emperor, played on it. On one of his coins a bagpipe appears, and we are told of a piece of sculpture, not long ago in Rome, of this instrument, greatly resembling its present form. The sculpture was supposed Grecian. St Jerome, in his epistle to Dardanus, alludes to the bagpipe in its more simple shape: *antiquis temporibus fuit chorus quoque simplex pellis cum duabus cicutis æreis, et per primam inspiratum secunda vocem emittit.* In France it appears likewise in its simple state, in the *Danse des Aveugles*, in the 15th century; and it is among the instruments represented in the Dance of Death, at Basle, in Switzerland.

The bagpipe is said to be of great antiquity in Ireland, and to have been early known in Britain. In the twelfth, or thirteenth century, we see it represented without drones, or with only one, having a flag, bearing a coat-armorial, such as was recently used in the Highlands of Scotland. King Edward III. had pipers; and Chaucer, speaking of the minstr
a vagrant tribe, describes the bagpipe under
name of *cornmuse*, which is the appellation at pres
given to it in France:

Cornmuse and shalmes, many a floyte and lytlynge hon

Among the musicians of Queen Elizabeth's hou
hold are named pipers.

With regard to the introduction of the bag
into Scotland, we are altogether uncertain. E
nent authors have affirmed, that it was not know
the battle of Bannockburn, in 1314. But a bagp
with one drone, appears among the sculptures
Melrose Abbey, which, we are told, is a very
edifice. James I. of Scotland, who was murdere
1436, is said to have been a performer on this inst
ment. We only know of its being in general
during the last, or perhaps the preceding cent
At present it enters the list of military instruments,
every Highland regiment has a piper; and, as a
tional instrument, we have heard of institutions
teaching it in the isles of Mull and Skye. Neit
pupil nor preceptor, however, being able to re
musical notes were represented by pins driven i
the ground. To encourage the cultivation of
instrument, annual premiums have been recently
tributed by the Highland Society to the most
nent performers. A competition, generally in
end of July, takes place before a committee of
Society at Edinburgh, who decide on the merits
the candidates. The competition lasts several hou
and Highland dances, introduced by way of interlu
are performed with uncommon skill and agility.
doubt if this kind of music can ever be broug
to great perfection, on account of the defects insep
rable from the instrument. But the passionate attac
ment which the Highlanders display for it, and t
use of which it has actually been in gaining victor
on the day of battle, render it a fit subject for e
couragement. See Bartholinus *De Tibiis Veter*
Montfaucon *Antiquit. expliq. Essai sur la Musiq*
tom. i. Fordun *Scotichronicon*. Pennant's *Tour*
Scotland, vol. i. ii. Kotzebue's *Travels in Italy*. Strutt
Sports and Pastimes of the People of England. (

BAHAMA ISLANDS, a name given by the En
lish to that cluster of small islands, rocks, and re
called by the Spaniards *Lucayos*, which stretch,
a north-westerly direction, from the northern co
of Hispaniola to the Bahama strait, opposite the Fl
rida shore; a space of near 300 leagues, from abo
22° to 28° of N. Lat. and from about 70° to 80°
W. Long. The whole number of these islands, co
prehending those, whose smallness, barren soil,
want of water, render them uninhabitable, amounts
about 500. Of these, the principal are—Providen
27 miles long, and 11 broad, whose capital, Nass
is the seat of government; Abaco, Harbour Isla
Eluthera, Exuma, St Salvadore, called by the I
dians Guanahani, Long Island, Andros, and Bimin
These islands, though unimportant in themselves,
but little known to European geographers, are ent
tled to particular notice, as it was on one of them th
the great Columbus first landed, after a voyage, th
most adventurous and magnificent in design, and th
most important in its consequences to the two hem

had ever been undertaken. The island
us honoured was St Salvadore, to which
iners have given the name of Call Island.
bus erected a cross; and, taking posses-
the name of his Catholic majesty, gave it
m which it still bears. The more import-
ing regions, however, which he afterwards
revented him from making any permanent
n St Salvadore; and the Bahamas were
eglected, till, about the year 1629, the
n animated with all the ardour of adven-
o plant on the island of Providence, which
been uninhabited. Some years after, Cap-
n English mariner, then on a voyage to
s forced, by stress of weather, to land on
isles; and, on his return to England,
urable a report of their soil and climate,
of them was solicited and obtained by
oprietaries of Carolina. Sayle soon af-
em a second time, and gave the English
such a flattering account of the advan-
night be derived from the possession of
Providence in particular, that they were
end out thither a governor and colony,
ear 1672. This settlement, however,
harassed by Spanish pirates, that it be-
ry to abandon Providence, and all the
nds. They now became the resort of
annoyed the American trade to such a
the English government was at length
take some strong measure in order to
. In the year 1721, King George I.
usion of peace with Spain, sent out a
odge these outlaws, and to fortify and
nd of Providence. The Bahamas, how-
ver risen to any degree of importance
her islands in this immense commercial

Such, indeed, was their insignificance,
any information could be obtained con-
, even by the lords of the committee of
e affairs of trade and plantations. "To
of their lordships, in 1789," says Mr
rds, "as to the extent of territory in
the quantity of land in cultivation, the
white inhabitants, productions, exports,
answer that could be obtained from the
s, that it was at that time impossible to
of those particulars. It appears, how-
e testimony of other persons, that these
n general rocky and barren; that the
ultivated for exportation is cotton, of
edium export is 1500 bags, of 2 cwt.
e inhabitants (who, in 1773, consisted of
and 2241 blacks) have of late years
rably augmented by emigrants from
ica; but of their present numbers no
nt is given." See Edward's *History of*
ies, vol. i. p. 574, 8vo edit. (μ)

, the name of one of the eleven provin-
ch Hindostan was divided by Acbar.
d to the west of Bengal, and is about
g, and 200 broad. Wheat, rice, and
oduced in considerable quantities, and
furnishes the greater part of the salt-
s imported by the East India company, and a considerable proportion of the cottons sent to England to be printed. The chief produce of this province is opium, which is now become a most important article of commerce, from the great demand for this drug in China, into which it is smuggled with the connivance of the government. The revenue of Bahar under Aureng-zebe was 101½ lacks of rupees. Patna is the capital of the province, the greater part of which belongs to the British. See Fraser's *History of Nadir Shah*, p. 34.; Hodge's *Travels in India*, p. 44.; and Valentia's *Travels*, vol. i. p. 91. (*o*)

BAHIA DE TODOS LOS SANCTOS, or SAN SALVADOR, the name of the chief town of a rich province of the same name in Brazil. It is situated on the eastern side of All Saints' Bay, on a rocky foundation, often 600 feet above the level of the sea, and is defended by a numerous garrison, and by several forts and batteries. The revenue of the city is partly derived from exorbitant duties on merchandize, but chiefly from the Brazil wood, and from the produce of the gold and diamond mines in the neighbourhood. The trade of Bahia with Lisbon and Oporto is carried on by means of about 50 vessels, which supply the province with linen, woollen, silks, hats, wheat, flour, rice, wine, furniture, bacalhao, cheese, salt, and the manufactures of Europe and India; and carry back gold, cotton, sugar, coffee, tobacco, skins, and a variety of woods, balsams, and gums. The province of Bahia extends about 50 leagues along the coast. Provisions are very dear, and the climate unhealthy. The population of the city is nearly 100,000; of which 30,000 are whites, 30,000 people of colour, and 40,000 negroes. E. Long. 39°, N. Lat. 12° 30′. See Lindley's *Narrative*, 8vo. 1805, p. 271.; and Sir G. Staunton's *Embassy to China*, vol. i. See also BRAZIL and ST SALVADOR. (*o*)

BAHR EL ABIAD. } See ABYSSINIA.
BAHR EL AZREK. }

BAHRIN, or BAHHREIN, or BAHAREM, a word signifying *two seas*, is the name of a group of small islands situated on the western side of the Persian gulf, and long famous for their pearl fishery. The chief islands are Aval or Bahrin, Samahe, and Arad, or Ennebi Salehh. The Bahrin islands once belonged to the Portuguese, but afterwards fell into the hands of the Persians and Arabians, who obtained alternate possession of them. They now belong to the Schiek of Busheer; but the revenue which he derives from them has been much diminished by the obstinacy of the Houls, a tribe of Arabs between Gombroon and Cape Bardistan, who refuse to pay duty for the privilege of fishing pearls. The unequal pearls are sent to Constantinople, and other parts of Turkey, and the perfect ones are exported to Surat, from which they are diffused over the whole of Hindostan. The fishing vessels, amounting according to some to 3000, and only to 300 according to others, pay several duties, one to the king of Persia, another to the sultan of Bahrin, and a third to the prince to whom the fishermen are subject. The pearls found here sometimes weigh 50 grains, but in general their weight is only about 10 or 12 grains. The inhabitants of Bahrin obtain from Surat their cloths and silks, by means of Moorish merchants. A lack of rupees, the annual amount of the Schiek's revenue, is scarcely sufficient to support the fortifications of Bahrin, and maintain the garrison. We are informed by Niebuhr, that at some distance from these islands, at the depth of 2¼ fathoms, the fishermen have found good spring water, and are in the habit of diving to the bottom to fill their bottles. The whole group of islands contain about forty or fifty mean villages. The inhabitants are Shutes, and speak the Arabic language. E. Long. 48° 10′, N. Lat. 26° 40′. See Niebuhr's *Travels*, sect. xxiii. chap. vi. and Peuchet's *Dict. de Geograph. Commerç.* See also AVAL. (*j*)

BAIÆ, or BAIAS, now BAIA, an ancient village of Campania, now the province of Lavora in Italy, celebrated for its hot baths, and for the mild temperature of its climate. Owing to the vast demand for buildings, and to the smallness of the place on which they could be erected, the sea was driven back by huge moles and buttresses, and Baia became a large and opulent city, and flourished till the time of Theodoric. After the irruption of the northern hordes, however, Baia declined in wealth and splendour. The sea broke down the barriers which confined it, and frequent earthquakes completed the devastation of this enchanting retreat. See *Martial*, xiv. ep. 81; *Horace*, i. ep. 1; *Strabo*, lib. v.; Keysler's *Travels*, vol. iii. p. 144, 145; Kotzebue's *Travels in Italy*, and Swinburne's *Travels*, vol. iii. p. 42. (*o*)

BAIANUS SINUS. See Swinburne's *Travels*, vol. iii. p. 48, and POZZUOLO.

BAJAZET I., Sultan of the Turks, and a celebrated warrior, was the son of Amurath I., whom he succeeded in the throne of Bursa, in the year 1389. He was 44 years of age when he assumed the government, and, during a period of 14 years, he ravaged alternately, with savage fury and enthusiasm, the continents of Asia and Europe. Bred in the camp of his father, his youth was spent in the exercise of arms. He had shared the dangers, and he inherited the warlike spirit, of the victorious Amurath; but the mildness and modest demeanor of the father, was lost in the haughtiness and cruelty of the son. The first act of his reign was marked with the blood of his brother, whom he accused of aspiring to the throne; and Lazarus, prince of the Servians, was beheaded in his presence, to expiate the guilt of his countrymen, who were charged with the death of Amurath. The love of conquest was Bajazet's ruling passion, and Christian and Moslem equally felt the effects of his ambition. After having overrun Caramania, and the northern regions of Anatolia, he crossed the Hellespont, and reduced to subjection the Bulgarians and Servians. Passing the Danube, he overthrew Stephen, prince of Moldavia, on the banks of the Siret; but the triumphant Othman was checked in the career of victory by a handful of Moldavians. Stephen, animated by despair, having collected 12,000 of his countrymen, returns to the field of battle, disperses the enemy scattered abroad in quest of plunder, and afterwards defeats them with dreadful slaughter near his capital Jassi. The sultan of Bursa, the terror of the world, is compelled to fly with a few attendants to Adrianople; and seven huge piles of Turkish bodies proclaim the valour of Stephen, and the disgrace of Bajazet. Disturbances
in Caramania demanded his immediate presen
Asia; and the haughty Othman, more enraged
discouraged by his late disasters, hastily raises a
my in Europe, and, by the incredible rapidity o
march, falls upon the astonished Caramanians,
they believed that he was still on the north of
Hellespont.

The Grecian empire was confined by Bajazet
in the walls of Constantinople, which was suffi
all the horrors of a blockade. The princes of C
tendom, moved by the suffering situation of
brethren, determined to crush at once the pres
tuous Moslem, who had threatened to annihilat
power of the emperor of the East. Sigismond,
of Hungary, commanded the bravest knights of
many and France, who were eager to try their p
ess against the "usurping infidel;" and 10
warriors boasted, that if the sky should fall,
could uphold it on the points of their lances.
zet met them at Nicopolis. The Christians
routed. The greatest number were either sla
drowned in the Danube, and Sigismond escaped
with his life. A train of noble captives grace
triumph of the Othman sultan; and 200,000 d
redeemed the Count of Nevers, and twenty-four
of France. It was stipulated, that they should
carry arms against the person of their conqu
but the pride of Bajazet relieved them from th
generous restraint: "I despise," said he to N
"thy oaths and thy arms. Thou art young,
mayest be ambitious of effacing the disgrace or
fortune of thy first chivalry. Assemble thy po
proclaim thy design, and be assured that Bajaze
rejoice to meet thee a second time in a field of bat
Bajazet now returned to the destruction of Co
tinople. His haughty mandate was delivered t
emperor: "Thou hast nothing left beyond the
of your capital. Resign that city, and stipulate
reward, or tremble for thyself and thy unh
people." But this city was preserved by the ap
ance of an enemy equally hostile to the Chri
powers. Tamerlane the Great had entered A
nia with a mighty army, and demanded of B
submission and obedience. The epistle of the T
breathed defiance and contempt, and concluded
these insulting words: "Thou art no more th
pismire; why wilt thou seek to provoke the
phants? Alas! they will trample thee under
feet." Bajazet had been accustomed to the lang
of adulation and dependence, and could ill brook
scoffs of an equal. The feelings of his indig
soul burst forth in the keenest reproaches.
branded Tamerlane as the thief and rebel of the
sert, who had triumphed only by his perfidy.
dared him to try the arrows of his flying T
against the scymitars and battle-axes of his invin
Janizaries: "The cities of Arzingan and Erze
are mine," said he, "and unless the tribute be
paid, I will demand the arrears under the wal
Tauris and Sultania." The armies of the rival c
encountered on the plains of Angora. Bajazet
played all the qualities of a soldier and a general
he could not prevent the flight and desertion o
troops, some of whom had been tempted by the
mises of Tamerlane. After a most obstinate and

conflict, in which 340,000 combatants are have fallen, the Turks were defeated, and was taken in the pursuit.

conduct of Tamerlane towards his captive s been variously described. The "iron cage," h Bajazet was confined, and against the bars of he is said to have dashed out his brains in vexa- despair, has been rejected by some as a popular ut though the Persian historians are altogether pon this subject, we see no sufficient reason for ting the testimony of Poggius, Phranza, and ntemporaries, who assert, with confidence, the ment and harsh treatment of Bajazet. We however, that we cannot enter into all the tances of the story; but allowing for the ex- ion of some, and the inaccuracy of others, a warrantable conclusion may be deduced, that owed his premature death to the severity of ne. Taking even the relation of Tamerlane's ists as an authentic record, the generosity Tartar towards his captive was at best but a y. It was the generosity of a barbarian, who d nothing to his humanity, and who wished ct the applause of his followers by his conde- . At a splendid banquet, amidst a crowd of nts, he invested Bajazet with the ensigns of bestowed upon him the kingdom of Anato- promised to restore him to the throne of his ; but he still kept him in confinement, and him as a trophy of his valour and good for- Bajazet died of an apoplexy at Akshehr, nine months after his defeat, A. D. 1403. ane dropt a tear over his expiring victim; re- upon the instability of fortune, which, by nce of war, might have rendered the fate of his own. His corpse was conveyed with magnificence to Bursa, and there interred in mausoleum.

ambition of Bajazet kept him almost conti- in the field. After the battle of Nicopolis, dly threatened to lay siege to the capital of ry, to subdue the adjacent countries of Ger- nd Italy, and to plant the crescent on the ca- the Romish Hierarch. The fiery energy of l, the secrecy with which he concealed his de- and the rapidity of his march, procured him pellation of "Ilderim," or lightning; and in de of conquest he compared the march of the to the creeping of a snail. His justice was a despot, who disdains to balance the weight ence, or to measure the degrees of guilt. He the belly of one of his chamberlains to be cut r drinking the goats-milk of a poor woman; clemency was an act of condescension rather humanity. In the midst of war, he forgot arts of peace. He was a great lover of ar- ure; and temples, academies, and hospitals, ected by him every year. He was the first n sovereign who assumed the title of Sultan, decessors having contented themselves with Emir; and a fleet of gallies, stationed at li, to guard the passage of the Hellespont, uilt at his command, and was the first navy ossessed by the Othmans. See *Mod. Un.* ol. xii. p. 68—89. *Memoires* de Boucicault. D'Herbelot, *Biblioth. Orientale.* Gibbon's *Hist.* chap. 64, 65, 4to, vol. vi. p. 321—357. (*p*)

Baidar, Baikal.

BAIDARS, the name of a kind of canoe used by the natives of the Kurilly Islands, and of the north-west coast of America. See Sauer's *Account of Billing's Expedition to the Northern Parts of Russia from* 1785 *to* 1794; and Sarytschew's *Account of the Voyage of Discovery to the N. E. of Siberia*, chap. vii. (*j*)

BAIKAL, a lake situated in the government of Irkutsk in Siberia, and, next to the Caspian Sea, the largest expanse of water within the limits of the Russian empire.

No where, perhaps, could a person, who should traverse the globe, meet with an object more truly interesting than the Baikal, whether we consider the rude sublimity of its scenery, or the singular phenomena which both the lake itself and the surrounding country present to the observation of the naturalist. Those who have visited this wonderful place, seem at a loss for language adequate to the feelings which it excites when first beheld. After travelling through a vast extent of country, diversified by neither lake nor sea, the traveller at length reaches a chain of rugged mountains, which, forming an immense amphitheatre, enclose a lake that stretches far beyond the reach of sight, and, by the violent agitation and dreadful roaring of its billows, sometimes assumes all the magnificence of a mighty ocean, while, at other times, the clearness of its unruffled bosom emulates the lustre of the finest mirror.

The traces of those tremendous concussions, by which our world has once been agitated, are here extremely discernible. The lake itself can only be regarded as an enormous gulf, formed by the rending of the mountains, and intended by nature as a reservoir for her immense stores of water; while its rocky shores bear in almost every spot the visible marks of some terrible revolution, of which they indicate, at the same time, the remote antiquity. Its channel consists of the broken fragments of hills, the largest of which still rise above the surface in the form of islands. Its coast is one heap of broken rocks piled above each other to the height of forty fathoms. Cliffs, whose bases are sunk in unfathomable pits, lift, their shattered summits to the clouds; and on the pinnacles of the loftiest mountains are found enormous stones in whimsical shapes, which could only be projected thither by some violent convulsion of the earth.

Nature seems to have exhausted herself by one great effort in forming the Baikal; for, though earthquakes are still frequent in the surrounding regions, they are in general so slight, that their shock is not felt at any considerable distance. The most remarkable effect of these earthquakes is visible in the lake itself, which even in the serenest weather, and while its surface is smooth as glass, sometimes undergoes the most violent internal agitations. At times, too, in a particular part of the lake, a single wave will suddenly rise, which is succeeded by several others in the same spot. Most of the phenomena, indeed, observable in the Baikal, seem to be peculiar and anomalous. The state of its surface is almost entirely independent of the violent storms to which it is subject. Even in a very moderate breeze it often rages with alarming fury, while the strongest gales scarcely produce any perceptible increase of agitation.

These peculiarities render the navigation of this lake extremely hazardous; for, however inviting the weather may be, and however propitious the gale, a vessel may suddenly be wrecked by one of those violent commotions, which no sagacity can foresee, and no activity controul. Furious hurricanes, too, often burst in a moment from the surrounding mountains, and if, on these occasions, the bark happens to be in a narrow or shallow part of the lake, its destruction is inevitable. At a distance from the shore, the danger is less imminent; as in the middle of the lake there are no hidden rocks nor banks against which a vessel can strike. The mariners who navigate the Baikal have a compass peculiar to themselves, in which they distinguish only three winds. Those which blow between the north and south are called *Bargusin*, because they proceed from the direction of the river Bargusin: when they prevail, the passage is expeditious from the mouth of the Selenga to the opposite shore. Those which arise between the north-west and south-west are called *Koultouk*, as coming from the extensive bay of that name: while the north-winds, which are by far the most dangerous, are named GORNAIA POGODA, or *winds of the mountains;* because the northern shore, from which they spring, is particularly mountainous.

The Baikal extends from the 51° to above the 55° of North latitude. It is upwards of 300 miles long, and its breadth varies from sixteen to fifty miles. Its depth, though unequal, is in some places incredibly great. In some of the central gulfs a line of more than three thousand fathoms could not reach the bottom; and Pallas mentions that from the middle of this lake to its northern shores, the depth was in general so immense, that a clue of packthread more than an ounce in weight was insufficient to sound it. Of the rivers that discharge themselves into the Baikal, the principal are the Upper Angara, the Bargusin, and the Selenga, which join it from the north, the east, and the south. The only outlet from this enormous reservoir is the Lower (or Great) Angara, which, bursting from its western side with impetuous rapidity, through a channel more than a mile broad, interspersed, too, with huge fragments of rock, presents a scene of awful sublimity, and stuns with its thundering noise the inhabitants of all the adjacent regions, to the distance of many miles. It cannot be supposed, however, that this single channel is at all adequate to the discharge of such a prodigious body of water; yet the lake seldom rises, even in the spring season, more than three feet above its ordinary level; so that it appears probable that part of it may be absorbed by some subterraneous drain. The water of the Baikal is so clear, that at the depth of eight fathoms the bottom is distinctly seen; yet at a distance it assumes a greenish hue. It is very agreeable to the taste, except in the month of July, when it is thrown into a kind of fermentation, called its flowering, which renders it somewhat nauseous, and gives it a turbid appearance, as if mixed with yellow sand.

A lake, distinguished by such bold and singular
features, fills all who behold it with astoni
awe; and is regarded by the superstitious
of the surrounding country with a very na
ration. They dignify it with the name of
Sea; and to call it simply a lake, the
such a degree of profanity as cannot fail
the immediate vengeance of heaven. A
had the hardihood to give it that contem
pellation, was tossed with his crew from
shore, till, exhausted by fatigue and hung
danger of immediate shipwreck, he was
compelled to implore the compassion of
Sea. His prayers were heard—he reache
in safety; and from that moment never
sea but with the most profound reveren
small distance from the lake there is a
dicated to St Nicolas, to which the m
pair to conciliate the favour of the saint by
and to prefer vows and supplications for a
voyage. As soon as they set sail, they th
presents into the lake, either of money or
and if after all they happen to be over
storm, they uniformly ascribe it to the p
some Jonah on board.

In the neighbourhood of the Baikal th
extremely severe, owing chiefly to the e
the ground, and the want of sufficient sh
the north winds. Scarce a night in the
mers which there diversify the year pass
frost; and even in August the approach
announced by frequent falls of snow.
however, is never frozen over till late in
and the ice generally dissolves about the
of May. Ice-fields, several miles in lengt
formed in the bays, and while congelatio
on, the rest of the lake is covered with a
till the whole becomes one solid mass,
cording to the calmness or agitation of
during the process of freezing, is either s
mirror, or so rough as to be scarcely passa
violent winds prevent the snow from adh
so that to travel over it at first is an und
extreme difficulty. Sometimes the driver,
ning by the side of his sledge, is thrown
a sudden squall, to the distance of severa
and is thus in danger either of being fro
falling into chinks still left in the ice. A
of breaking up approaches, these chin
wider and more frequent; boards are then
them for the accommodation of travellers,
the apertures can no longer be passed in th
canoes begin to ply between the fields of
dangerous mode of conveyance, however,
necessary; for, when the thaw once comm
ice is very rapidly dissolved. In some of
however, which are shaded by the impend
tains from the sun, large masses of ice lie
throughout the whole summer.

Of the islands of the Baikal, which are
rous, the most remarkable is the islan
near the northern shore, and separated
main land by a sound. This island is 5
length, and nearly ten in breadth, and is
by about 150 families. It terminates in
tory towards the north; on the south-eas
and bare; but its south-western coast is f

y groves of poplars, willow, birch, and pines. he pasture is so rich, that large droves of cat- maintained through the whole winter, without ticular care or tending from the inhabitants, end almost their whole time in drinking, or in .

coasts of the Baikal present many objects well deserve the attention of the naturalist. , impregnated with sulphur and naphtha, are ound in various places, many of them remark- or their medicinal virtues. One of these , in particular, opposite the western side of , is so extremely copious, as to yield 582 every hour. Its water, being highly sulphure- s a fœtid taste; and is so hot, that birds are n it in the space of twelve minutes. In cu- disorders, this spring has been found to pro- e happiest effects. It is employed for bath- well as taken internally. To the south of gusin peninsula, there is a lake, called Duk- or *Vapoury*, the water of which is slimy and h, and has a nauseous acid taste. The whole is annoyed by its fœtid exhalations; yet the telf, when taken in a vessel, has no offensive The lake even swarms with various kinds of hich are often stifled, however, during winter, he putrid water is covered by an impenetrable f ice. Perhaps, therefore, the intolerable of this region may be owing, not so much peculiar quality in the lake itself, as to antity of fish that lie putrifying on its shores. the mineral waters on the coast of the Baikal, more celebrated than the Turkobad, which, from seven springs, some of them cold and hot, flows into one reservoir, and is found eneficial in many disorders. Near the same here is found naphtha, which the lake throws the spring, incrusted in lumps with ice, and mes two or three inches in diameter. It is a rown clammy substance, capable of being d, soluble in water of a moderate heat, of a t odour, and an excellent salve for wounds nning sores. These coasts likewise abound in e salts of different kinds.

numerating the wonders of these regions, we ot forget a curious *lusus naturæ*, which is to on the Shamane promontory. Three rocks, t to one another, tower more than two hun- et above the level of the lake; and their tops ich a striking resemblance to human heads, e Tunguses revere them as the sea-god Dian- th his two subordinate deities. The nose of anda, who stands between the other two, and s them considerably, is seven feet long; his ws seem two projecting cliffs overshadowing ; flocks of sea-fowl find harbour in his mouth; is altogether unprovided with ears. Not- nding this defect, however, his votaries believe hears acutely, and in all their fishing expedi- prefer to him their prayers that he may save rom being drowned, and grant them a plenti- ught of fishes.

plants most frequent in the sandy coast of the , and the neighbouring forest, are such as ge- grow on very cold mountains. Those enumerated by Pallas, are the *pinus cembra*, the *empetrum nigrum*, the *campanula*, with round leaves and large flowers, the *fumaria impatiens*, the *polygonum divaricatum*, the *polygonum sericeum*, a superb species of knotgrass, quite indigenous to the shores of this lake, the *scrophularia scorodonia*, the *dracocephalum nutans*, the *lycopsis vesicaria*, and the *triticum littorale*, which grows upon the shores in as great abundance as if it were sown, and is so like the gross kind of barley, that the peasants call it DIKAIA KOCH, or wild barley. Besides these, M. Pallas observed in the forest the *lonicera cærulea et pyrenaica*, the *linnea*, the *rubus articus*, the *pedicularis paniculata*, the *ledum palustre*, the *andromeda polifolia*, and various kinds of *pyrolæ*, and among others the *pyrola uniflora*, called by the Siberians KILLEREKA. The growth of these plants is occasioned by the cold and hazy air which prevails during summer on the lake, the high mountains which stretch along the southern part of the country, and the snow-clad summits which border the western side of the Baikal. In the lake itself there grows a kind of sponge, which is very sweet and thick, and has never been discovered in any other part of the world. In the language of the country it is called MORSKAIA SOUBA, or sea sponge; and Pallas has given it the name of *Spongia Baikalensis*. It is employed by the goldsmiths of Irkutsk to give the first polish to their silver-plate, and to vessels of copper and of brass.

Baikal.

The animal productions of the Baikal are still more curious and unaccountable than the wonders of its coasts. Of these, the most remarkable is a fish entirely peculiar to this lake, called by the Russians in that neighbourhood, SOLOMHANKA, and known to naturalists by the name of *Callyonymus Baikalensis*. It exactly resembles a clue of blubber, and when exposed on a gridiron to the most gentle heat, melts so completely away, that nothing remains of it but a slender bone. It is impossible to catch these fish in nets, nor indeed are they ever seen alive. They seem to confine themselves to the deep gulfs in the centre of the lake, and are generally thrown up to the surface in summer, during the violent hurricanes which burst from the mountains. When the lake has been strongly agitated, they are forced up in such quantities as to form a kind of parapet upon the shore. They are so rank and oily, that neither sea-fowl nor ravens will touch their carcase, and after remaining near two hours on shore, are dissolved by a slight pressure in the hand. The oil made of their blubber is sold to the Chinese, who value it highly.

Seals, likewise, abound in the Baikal;—a very remarkable phenomenon, as these animals are never seen elsewhere at any distance from the ocean, nor do they frequent rivers or lakes of fresh water. It appears probable, therefore, that they have been introduced into this inland sea by some extraordinary revolution, which has produced a considerable change in the level of the globe. Their skin is of a silver grey, and their number is so great, that no fewer than two thousand are taken annually. The hunting of these animals commences in April. They assemble in great flocks, where the rapid currents, or warm springs, make chasms in the ice, and frequently come out of the water to bask and sleep in the sunshine. The hunters, who are perfectly acquainted with their haunts, place themselves in small sledges, which they conceal with a screen of white linen. As this screen perfectly resembles the ice, it can be moved towards the seals without alarming them; and the hunters, who are provided with muskets, can thus approach so near as to fire upon them without the possibility of missing their aim. Another mode of catching these animals was employed when that country was visited by Mr Bell of Antermony. Holes were cut in the ice at certain distances, and nets were extended from one hole to another by means of long poles. The seals, unable to remain long under the ice, come to these apertures for air, and thus entangling themselves in the nets, became an easy prey.

But the most important fish in this lake is the Omul, which, both from its abundance and its excellent quality, is of inestimable benefit to all the surrounding country. The Omuls vary in size in different parts of the lake. Those caught near the mouth of the Selenga, rarely exceed two spans in length; while those which frequent the bay of Tschivirkoui, are represented by Pallas as enormous, though he does not state their particular dimensions. They bear a considerable resemblance to the herring, though Gmelin asserts, that the only property which they have in common with that fish, is the glittering of their scales. Their flesh is white and tender; and they are so extremely delicate, that they die as soon as they are taken out of the water. They are generally caught in the month of October, and, instead of being salted, are left by the fishermen to stiffen with the frost, which enables them to convey them fresh to the various markets, and to sell them at a higher price. Towards the middle of August, they begin to divide into shoals, and to ascend the rivers for the purpose of spawning. It is remarkable, that they generally resort to the same stream in which they themselves were spawned, and there are some rivers that flow into the Baikal, which they never visit, though shoals of them may be seen near their mouths. They advance up the rivers very slowly, halting regularly where the current is least rapid; and when they reach the ice, they are compelled to return. This fish, to which naturalists have given the name of *salmo migratorius*, is not confined to the Baikal. They are supposed, indeed, to have come originally from the Frozen Ocean, from which they force themselves up the Yenissey, and several other rivers. Besides the species of fish which we have already mentioned, several other varieties are found in the Baikal, such as sturgeon, carp, and tench, devil's lampreys, (called by naturalists *salmo oxyrrinchus*,) and lenki, or *salmo salvelinus*.

The fishery of this lake is farmed, and is extremely productive and valuable. It is prosecuted during the whole summer, with large drag nets upwards of two hundred fathoms long, to which is fastened a strong cord of about fifteen hundred feet. The net is drawn up by means of a windlass, to which the cord is attached. Pallas describes a net which is likewise employed on the Baikal, and which is precisely the same as the stake-nets used in our salmon fisheries. "These nets," says he, "are formed by
a small enclosure (or park,) with branches wh
tend some fathoms into the water. At the ex
of this park there are other small ones, whic
two oval chambers, which are entered by a
angle. This angle is formed by the two ch
and the park which descend from the shore
fish, entering the park, proceed towards the b
they find at the angles a passage to penetrate i
chambers; they cannot get out, because the br
or rods, are pointed at the opening, as in a net
invention bears the name of Kotsi. It is not
elsewhere." (*k*)

BAIKAL Mountains. These mountain
nearly the same direction with the lake, accom
it on bóth sides from south to north and nort
and flattening on the west into a morassy ste
plain, of prodigious extent: to the east they
from the source of the Lena, along both sides
river, till at length they dwindle away into a s
ridge of flœtz. This range is generally ve
and craggy, consisting partly of granite, p
flint-breccia, and lime-stone. Coal is fre
found in the lower regions of the Angara an
where the flœtz mountain greatly declines. A
of this range seems to run westward through
gion between the Podkammenia, and the N
Túnguska, away over the Yenissey; this
probably consists of mere flœtz mountains.
the north-eastern part of the Baikal, the upp
gara, and the river Vitim, where lie the fam
of Muscovy-glass, the mountain is wholly co
of granite. The mineral contents of these mo
are far from being thoroughly known. The
pal minerals discovered in them are coals, aspl
sulphur sources, native sulphur, alum, comm
sources, lapis lazuli, Muscovy-glass, cornelian
ral prussian blue, and specimens of iron, copp
lead. Some of the Baikal mountains are s
that they are clad in eternal snows. Some
cliffs which tower above the surface of the lak
sist of solid white quartz. The mountains,
partly bare, are in general covered with fores
present many scenes no less beautiful than s
They contain the sources of many noble rive
principal of which are the Selenga, the Anga
Lena, the Vilui, and the Tungusa. See
View of the Russian Empire, vol. i. p. 16
241, 242; and vol. iii. p. 170, 171. *Voyage*
las, octavo, vol. v. p. 220, 226; and vol. vi.
123. Gmelin's *Voyage*, apud *Histoire Gene*
Voyages, tom. xviii. p. 226, 229, 231. Bell
vels, vol. i. p. 257—65. (*k*)

BAIL, in law, (from the Fr. *bailler*, to d
signifies the security given for the defendant's
ance in a process.

Bail is given both in civil and in criminal
In civil cases, bail is either *common* or *special*.
mon bail is taken when the defendant has bee
with a writ of *capias*, by the sheriff or his
and with notice to appear by his attorney i
to defend the action. If the defendant think
to appear upon this notice, his appearance is r
and he puts in sureties for his future attenda
obedience. These sureties are called *comm*
being the same two imaginary persons, Jo
and Richard Roe, that were pledges for the p

And if the defendant does not appear
turn of the writ, or within a short period
aintiff may enter appearance for him, and
bail in his name, as if the defendant had
self.

bail is taken only in actions of small con-
But in causes of greater weight, such as
bond or specialty, &c. where the plain-
affidavit, or asserts upon oath, that the
ion amounts to £10 or upwards, the de-
t put in substantial sureties for his ap-
hich is called *special bail*. And in such
quired by statute 13 Car. II. st. 2. c. 2,
e cause of action should be expressed in
the writ or process.

return of the writ, or within four days
efendant must *appear*, according to the
the writ. This is done by putting in
g bail *to the action;* which is commonly
g in bail *above*. If this appearance be
nd the bail taken by the sheriff *below* are
persons, the plaintiff may then take from
n assignment of the bail-bond, and bring
ainst the sheriff's bail. And if the bail
y the sheriff be insolvent persons, the
y have recourse against the sheriff him-

above, or bail *to the action*, must be put
open court, or before one of the judges
rt; or, if in the country, before a com-
pointed for that purpose, and transmitted
The bail, or sureties, to the number
least, must enter into a recognizance be-
ge or commissioner, whereby they jointly
y undertake, that if the defendant be con-
he action, he shall pay the costs and con-
or render himself a prisoner, or that he
for him: which recognizance is transmit-
court in a slip of parchment, entitled a
And the bail, if required, must *justify*
in court, or before the commissioner in the
swearing that they are housekeepers, and
m worth double the sum for which they
ter paying all their debts. This practice
legree analagous to the *stipulatio* or *satis-*
Roman law. *Inst.* l. 4. t. 11. ff. l. 2.

criminal cases, is taken in most offences
inferior degree of guilt; but not in felo-
her capital crimes, because, in these cases,
ld be a security equivalent to the actual
the offender's person. Both by the com-
atutory laws, it is an offence against the
e subject, for any magistrate to refuse or
l any person bailable; and it is expressly
statute 1 W. & M. st. 2. c. 1, that exces-
ght not to be required: but it must be
ourts to determine, according to the cir-
of the case, what bail shall be called ex-
ail may be taken either in court, or, in
ular cases, by the sheriff, coroner, or other
but most frequently by the justices of

be taken only where the imprisonment is
tody, before conviction, and not from prisoners already convicted. By the old common law, all felonies were bailable, till murder was excepted by statute; so that persons might be admitted to bail, before conviction, almost in every case. But the power of bailing in treason, and in divers instances of felony, has been taken away by sundry statutes.

The offences not bailable, according to Sir William Blackstone, are: 1. Treason; 2. Murder; 3. Manslaughter, if the prisoner be clearly the slayer. 4. Persons committed for felony, who have broken prison; 5. Outlawed persons; 6. Such as have abjured the realm; 7. Approvers, and persons by them accused; 8. Persons taken with the mainour, or in the fact of felony; 9. Persons charged with arson; 10. Excommunicated persons, taken by writ *de excommunicato capiendo*. The following are of a dubious nature, and it seems to be left to the discretion of the justices, whether they are bailable or not: 1. Thieves openly defamed and known; 2. Persons charged with other felonies, not being of good fame; 3. Accessaries to felony, that labour under the same want of reputation. The following *must* be bailed upon offering sufficient surety: 1. Persons of good fame, charged with a bare suspicion of manslaughter, or other inferior homicide; 2. Such person, charged with petit larceny, or any felony not before specified; or, 3. With being accessary to any felony. It is agreed, however, that the court of King's Bench, or any judge of that court in time of vacation, may bail for any crime whatsoever, whether treason, murder, or any other offence, according to the circumstances of the case. See Blackst. *Comment.* Jacob's *Law Dict.* (z)

Bailiff.

BAILIFF, (from the Lat. *ballivus*; Fr. *baillif*, i. e. *Præfectus provinciæ*,) signifies an officer appointed for the administration of justice within a certain district. The office, as well as the name, appears to have been derived by us from the French; and it is probable that our sheriffs of counties were also anciently called *bailiffs*, as the county is still often called *balliva*, or *bailiwick*. In the statute of Magna Charta, c. 28, and 14 Edw. III. c. 9, the word *bailiff* would appear to comprehend sheriffs, as well as bailiffs of hundreds. As the kingdom is divided into counties, so every county is divided into hundreds, within which, anciently, the people had justice administered to them by the several officers of every hundred, who were the bailiffs. And it appears from Bracton, (lib. iii. tract. 2. cap. 34,) that bailiffs of hundreds might anciently hold plea of *appeal* and *approvers*. But these hundred courts, certain franchises excepted, have been, since that time, swallowed up by the county courts; and the bailiff's name and office is now grown into contempt, they being, in general, merely officers or messengers employed to serve writs, &c. within their liberties. In other respects, however, the name is still in good esteem; the chief magistrates in many towns being called bailiffs: and sometimes the persons to whom the care of the king's castles is committed, are termed bailiffs; as the Bailiff of Dover Castle, &c.

The ordinary bailiffs are of several sorts.

Bailiffs of Liberties, are those who are appointed by every lord within his liberty, to execute processes, &c. Bailiffs of liberties and franchises are to be sworn to take distresses, truly impanel jurors, make returns by indenture between them and sheriffs, &c. and shall be liable to punishment for malicious distresses, by fine and treble damages. 12 Edw. II. st. 1. c. 5; 14 Edw. III. st. 1. c. 9; 20 Edw. III. c. 8; 1 Edw. III. st. 1. c. 5; 2 Edw. III. c. 4; 5 Edw. III. c. 4; 11 Hen. VII. c. 15; 27 Hen. VIII. c. 24; 3 Geo. I. c. 15, § 10.

Bailiffs of Sheriffs, or sheriff's officers, are either bailiffs of hundreds, or special bailiffs. Bailiffs of hundreds are officers appointed by the sheriffs to collect fines in their respective districts; to summon juries; to attend the judges and justices at the assizes and quarter sessions; and also to execute writs and processes in the several hundreds. But as these bailiffs of hundreds are generally plain men, and not thoroughly skilful in this latter part of their office, it is now usual to join *special bailiffs* with them. The sheriff being answerable for the misdemeanors of these bailiffs, they are therefore usually bound in a bond for the due execution of their offices, and are thence called *bound bailiffs*; which the common people have corrupted into a much more homely appellation.

Bailiffs of lords of manors, are those that collect their rents, and levy their fines and amercements, &c.

Bailiffs of Courts Baron, summon those courts, and execute the process thereof, &c.

Bailiffs of husbandry, are the officers belonging to private persons of property, who superintend the inferior servants, regulate their labour, &c.

Bailiff, Water, is an officer anciently established in all seaport towns, for the searching of ships. 28 Hen. VI. c. 5.

Such an officer still exists in the city of London, who supervises and searches all fish brought thither, and gathers the toll on the river Thames. He also attends the Lord Mayor in his excursions by water, and marshals the guests at table. He can also arrest for debt, &c. on the river Thames, by warrant of his superiors.

There are different other denominations of bailiffs to be met with in this and other countries; such as, *provincial*, *royal*, *itinerant*, and *heritable bailiffs*; *bailiffs* of France, of the empire, of boroughs, &c. See Blackst. *Comment*. Jacob's *Law Dict*. (*z*)

BAILLY, Jean Sylvain, a celebrated French astronomer, was born at Paris on the 15th September 1736. A genius for painting having been hereditary in the family for four successive generations, Bailly was bred to the profession of his ancestors, and made considerable progress in that delightful art. A passion, however, for poetry, and other branches of literature, distracted the attention of the young artist, and unfitted him for that intense and undeviating application to the practice of his art which can alone raise the painter to opulence and fame.

The friends of Bailly soon perceived that his mind was bent upon subjects foreign to his profession, and regretted that a genius so promising and ardent should be chained down to the practice of an art when it
aimed at the highest flights of literature and scien
An accidental acquaintance with the celebrated
tronomer La Caille, determined the general train
his studies, and inspired him with the most passion
enthusiasm for the science of astronomy. His fi
effort in this new career was the calculation of t
orbit of the famous comet of 1759, which was pu
lished in the memoirs of the academy for that ye
On the 29th January, 1763, Bailly was admitte
member of the academy of sciences, and in the sa
year he published three memoirs on the theory
Jupiter's satellites, and his reduction of the numer
observations made by La Caille in 1760 and 176
on 515 zodiacal stars. These reductions were pu
lished in 1763, at the beginning of the Ephemeri
computed by La Caille for the years 1765—1774.

The importance which was now attached to t
method of finding the longitude by the eclipses
Jupiter's satellites, turned the attention of astron
mers to the theory of these secondary planets. Th
interesting subject was proposed by the academy
the prize question for 1764, and Bailly engaged
the investigation with the utmost ardour. In t
illustrious La Grange, however, who was almost e
actly of the same age with himself, he found a fo
midable and a successful rival. In applying the prob
lem of the three bodies to the satellites of Jupiter
Bailly considered only the action of one satellite upo
another, while La Grange viewed the subject in a
more general aspect, and took into account the mu
tual derangements of all the four satellites. Th
results of Bailly's investigations were published i
1766, in a separate treatise, entitled, *Essais sur l*
Theorie des Satellites de Jupiter, suivi des tables d
leur mouvement; which likewise contained the histor
of that branch of astronomy. In this treatise h
happened to mention as his own, the discovery of th
cause of the variation in the inclination of the orbi
of Jupiter's satellites. This circumstance occasion
a dispute between him and La Lande, who laid clai
to the same discovery. Bailly asserted his own clai
in the *Journal Encyclopedique* for June 1773, but h
had afterwards the candour to state in his history
astronomy, the opposite claims of La Lande and himsel
and to leave the subject to the decision of his reader

The difficulty of finding the exact instant of th
immersions and emersions of the satellites of Jupite
stimulated Bailly to make a number of observatio
on this curious subject, which he has published in
interesting paper in the memoirs of the academy f
1771. The great discrepancy which was perceived
the observation of these eclipses, obviously arose fr
the diameters of the satellites, and from the differen
apertures of the telescopes with which they were o
served.* In order to determine the exact diamet
of the satellites, Bailly observed an immersion wit
telescope whose aperture was so much contrac
that the satellite could scarcely be seen, so that
became entirely visible when the smallest portion
its diameter had entered into the shadow. He t
observed the immersion of the same satellite with

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* On the 25th January 1762, Maraldi observed the immersion of the fourth satellite at 6h 16½′, with a good telescop
15 feet, while Messier, with a Gregorian telescope of 30 inches, observed the same immersion, at 6h 29′. See Astrono
part. i. chap. i. sect. xi.

whole aperture of the telescope, and from the interval of time which elapsed, he obtained the values of the diameters of the satellites, which we have given in ASTRONOMY, Table LX. p. 813.

Bailly had long meditated an extensive work on the history of astronomy, and in the year 1775, he completed the first volume of that profound work, entitled, *Histoire de l'Astronomie Ancienne.* The second and third volumes, entitled, *Histoire de l'Astronomie Moderne*, appeared in 1779, and the fourth in 1782, which completed the history of ancient and modern astronomy. The return of M. Gentil from India, with a new set of astronomical tables, the epochs of which extend to such a remote period as the year 3102 before Christ, attracted the attention of philosophers to this curious branch of the history of astronomy. These tables were put into the hands of Bailly, who diligently compared them with modern observations, and who found that they must either have been constructed from actual observation, or that the Indians must have been acquainted with the most refined and intricate theories of physical astronomy. The profound researches, the nice calculations, and the ingenious and acute reasonings by which he has supported the antiquity of the Indian astronomy, were published in 1787, in his *Traité de l'Astronomie Indienne et Orientale*, which completed the great work to which his life had been devoted.*

The *Histoire de l'Astronomie* by Bailly, is perhaps one of the most interesting books that has ever been written upon a scientific subject. His ingenious speculations respecting the early history of astronomy;—the copious brilliancy of his descriptions;—the eloquence with which he pleads the cause, and paints the sufferings of neglected genius;—and the glowing imagery with which his lively fancy every where embellishes the general narrative, throw an air of enchantment round the most common details. Even amid the driest enumeration of facts, the attention is perpetually arrested and kept alive by the most delicate touches of nature, and by the nicest discrimination of character. The loose and scattered materials which the history of astronomy often presents, are chained together in one connected narrative, and one astronomer follows another, and new discoveries spring from those which precede them, as if the progress of discovery had been under the controul of causes less accidental than those which nature has prescribed. But it is in those great and general views which constitute the peculiar province of philosophy, that Bailly shines above all praise. In tracing the effects of moral causes and political institutions on the advancement of astronomy, and on the general progress of our species;—in painting the baneful effects of an unholy superstition upon the happiness and improvement of mankind;—in describing those alternate periods of languor and renovation, which accompany the mighty convulsions of nations, which follow the tyranny or munificence of princes, or in which the human mind, without any apparent cause, sinks into torpid inactivity, or soars beyond its wonted flight;—in marking the connection between the various sciences, and estimating the mutual aid which each imparts to the advancement of the rest;—and in anticipating the conquests which human genius has yet to atchieve over vice and error, throughout every region of Nature—Bailly rises to a sublimity of eloquence, which could be inspired only by the powerful interest which he felt for the progress of science, and for the happiness of his fellow creatures.

Besides this extensive work, Bailly published the following papers in the Memoirs of the French Academy. "Memoir on the Epochs of the Moon's Motions at the end of the last Century." "On the Comet of 1762." "Astronomical Observations made at Noslon 1764." "On the Eclipse of the Sun of the 1st April 1764." "Observations made at the Louvre, from 1760 to 1764." "On the Cause of the Variation of the Inclination of the Second Satellite of Jupiter." "On the Motion of the Nodes, and on the Variation of the Inclination of Jupiter's Satellites." "Essay on the Theory of the Satellites of Jupiter." "Observations on the Opposition of the Sun and Jupiter." "On the Equation of Jupiter's Centre," &c. "On the Transit of Venus in 1769, and on the Eclipse of the Sun on the 4th June of the same year."

Like D'Alembert, his illustrious contemporary, Bailly was highly distinguished by his literary attainments. His Eloge upon Leibnitz, published in 1768, carried off the prize of the Academy of Berlin, and the eloges which he composed upon Charles V., Corneille, La Caille, Cook, Moliere, and Gresset, extended his reputation as an elegant writer. The speculations contained in the first volume of his History of Astronomy, respecting the early state of Upper Asia, led to a correspondence with Voltaire; the substance of which he afterwards published in two volumes, the first of which was entitled, *Lettres sur l'Origine des Sciences, et sur celle des Peuples de l'Asie*, Paris, 1777; and the second, *Lettres sur l'Atlantide de Platon, et sur l'Ancienne Histoire de l'Asie*, Paris, 1779. These two works, and the Eloges already mentioned, were published in two volumes in 1770, under the title of "Discourses and Memoirs;" and were reprinted in 1790, along with other discourses of Bailly, that had been pronounced when he was President of the National Assembly, and Mayor of Paris.

A similarity of opinion with the celebrated Buffon, occasioned such an intimacy between Bailly and that able naturalist, that when the office of secretary to the Academy of Sciences became vacant in 1771, Bailly offered himself as a candidate, and was supported by all the influence of Buffon. The interest of D'Alembert, however, was powerfully exerted in favour of Condorcet, and Bailly lost his election. He did not, however, long enjoy the friendship of Buffon. The opposition which he made to the admission of the Abbé Maury into the French Academy, irritated Buffon, and dissolved the friendship which they had mutually cherished. Besides those

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* A general view of the arguments employed by Bailly and Professor Playfair, in defence of the authenticity of the Indian tables, will be found in the history of ASTRONOMY, p. 585.

Bailly.

works which we have already mentioned, Bailly composed in the years 1781 and 1782, a work on the Fables and religious creeds of antiquity, entitled, *Essai sur les Fables et sur leur Histoire*, two volumes of which were published in 1799.

In the year 1784, Bailly was elected secretary of the French Academy, and, in 1785, he was chosen a member of the Academy of Inscriptions and Belles Lettres; the only case since the time of Fontenelle, in which the same person was at once a member of the three learned academies which then flourished in Paris.

The public attention having been attracted to the subject of Animal Magnetism, Bailly was appointed a member of the committee for examining the miraculous effects which were said to be produced by this new art. The report which he drew up for the Academy of Sciences was translated into English, and was universally admired for the elegance of its composition, and the sound philosophy which it displayed in developing the effects produced upon the body, by the influence of moral causes.

In the year 1786, a committee was appointed by the academy, to examine a plan for a new hotel-dieu by the architect Poyet. Bailly, who was one of the number, drew up a long report, of 250 pages, which did great credit to the genius and the humanity of its author.

It would have been fortunate for Bailly had his life now terminated, when worn out with the labours of science, and loaded with the high rewards which are reserved for genius and learning. A fatal necessity, however, dragged him from the hallowed retreats of philosophy upon the stage of public life, and compelled him to act a conspicuous and a zealous part in that bloody struggle by which his countrymen sought for the blessings of a free government. Those who have witnessed the atrocities of this barbarous revolution, and have seen it terminating in a military government, more oppressive than the despotism of the House of Bourbon, may well question the prudence of a people who throw themselves loose from the wholesome restraints of the law, and seek for a reformation of their government from the assistance of an unbridled populace, and amid the selfish tumults of contending factions. But they are not entitled to sit in severe judgment upon the conduct of those who listened to the groans of an oppressed people, and who lent the courage of their hearts, and the vigour of their minds, to impose a salutary check upon the licentiousness of arbitrary power, and to establish, without the waste of blood, the eternal and immutable principles of rational freedom. Bailly was one of those true patriots, who panted for the deliverance of his country, and proffered his most ardent exertions in her sacred cause. On the 26th of April 1789, he was chosen secretary by the electors of Paris; and when the states-general assembled in the same year, he was elected deputy to the *Tiers Etat*, or Commons, and was afterwards appointed president of that magnanimous body. When the National Assembly was constituted, Bailly was appointed president for four days. The proclamation of the king to disperse this illegal combination, bound together by new ties the members of the National Assembly. They resolved to assert the rights of the people; and Bailly dictated the famous oath to the members of the *Tiers Etat*, "that they would resist tyrants and tyranny, and would never separate till they had obtained a free constitution." On the 15th of July 1789, the day after the surrender of the Bastille, M. Bailly was appointed, by general acclamation, Mayor of Paris, an office which had long been dormant. The courage which he displayed in fulfilling the duties of this high trust, was uniformly tempered with moderation; and while in the rigorous execution of the laws, he avoided the extreme of harshness and cruelty, he never forgot the imperious duty of forwarding the views of the popular party, and baffling the plans of the court faction, who resisted every restraint, however rational, upon despotic power. In testimony of the high esteem in which his public conduct was held, his bust was placed with great pomp in the municipality, and likewise in the academy of sciences, where those of living academicians had never before been admitted.

Though a deserved favourite with the people, the temperate measures which he pursued did not well accord with the passions of an unbridled mob, from whom the fetters of despotism had been but newly broken. Bailly saw with regret, the dreadful extreme to which their fury was hurrying them on. He resolved to make one effort for the preservation of tranquillity, and hoped that by measures of decisive energy he might yet oppose an effectual barrier to the swelling tide of universal anarchy. He therefore opposed the violent proceedings of Marat and Hubert. He arrested the deputies from the military insurgents at Nancy. He exerted himself to persuade the populace to allow the royal family to depart for St Cloud; and on the 17th July, 1791, when the mob demanded the abolition of monarchy, and assaulted the troops that were called out to disperse them, he ordered the soldiers to fire, by which about forty persons were killed, and above four hundred wounded. By these measures he lost the favour of the populace, and resigned the mayoralty on the 16th November 1791, when the constituent assembly was dissolved.

The ill health into which he had now fallen, induced him to travel through different parts of France in 1792 and 1793, and to pursue in the bosom of peaceful retirement those delightful researches which the political convulsions of his country had so cruelly interrupted. During this seclusion, he amused himself in composing memoirs of the events in which he bore such a conspicuous part;* and when employed in this occupation, he was arrested by the orders of Robespierre, and condemned to death on the 10th of November, 1793. Clothed in the red shirt, Bailly was placed in a cart, with his hands tied behind his back, and driven to the fatal guillotine, erected on the spot where he had ordered the military to fire upon the people. The very populace who had once adored him, and whose best interests he had so near his heart, threw mud upon him as he passed, and followed him with the most insulting reproaches; whilst the cold rain incessantly poured on the grey head of the venerable sage. Having reached the fatal spot, it became necessary to remove the guillotine to firmer ground. During this operation, Bailly was taken from the cart, and compelled to walk round the field, to glut the insatiable cruelty of the mob. The brutal multitude spit upon him as he passed, and, notwithstanding the exertions of the executioners, some of them even struck him upon the face. When the apparatus of death was again prepared, Bailly, drenched with rain, and shivering with cold, ascended the platform. "You tremble, Bailly," cried one of the mob in a tone of insult. "I tremble, it is true," replied the philosopher, "but not with fear."

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* These Memoirs, which are expected to be soon published, occupy 600 quarto pages, and come down to the 2d October 1789.

Such were the last words of a man, who, during a life of 57 years, acquired the highest reputation as a philosopher and an elegant writer. Even in the turmoils of a political life, so foreign to his temper and his studies, he obtained the approbation of the most opposite factions, and left behind him a character of the most disinterested integrity. When he held the office of mayor, he spent part of his fortune in relieving the wants of the poor; and he exhibited the same affectionate disposition in educating eight nephews with all the tenderness of a father. The person of Bailly was considerably above the middle size, his deportment was sedate and grave, and his countenance expressed the intelligence and the goodness which he possessed. In the year 1787, he married Jeanne Leseigneur, the widow of Raymond Gaye, the treasurer of the clergy, who had been his intimate friend for 25 years. See Bailly *Hist. De l'Astronomie*, tom. iii. p. 69, 70, 180. *Journal Encyclopedique* de Juin 1773. *Decade Philosophique, litteraire et Politique*, 18 Fev. 1795. La Lande *Bibliographie Astronomique*, p. 730. Riouffe, *Memoires d'un Detenu*. (s)

BAILMENT, in the law of England, is a delivery of goods in trust, upon a contract expressed or implied, that the trust shall be faithfully executed on the part of the bailee, to whom they are delivered, and that the goods shall be restored, as soon as the purposes of the trust are fulfilled.

Bailment comprehends, 1. Deposit; 2. Loan (*mutuum, accomodatum*); 3. Hire (*locatio* or *conductio*); 4. Pledge; 5. Carriage of goods for reward; 6. Mandate, or acting by commission.

In bailment there is a special qualified property transferred from the bailor to the bailee, together with the possession. It is not an absolute property in the bailee, because of his obligation to notoree; and the bailor hath nothing left in him but the right to a *chose in action*, grounded upon his contract, the possession being delivered over, in the mean time, to the bailee. The bailee being responsible to the bailor, if the goods should be lost or damaged by his wilful default or gross negligence; it is reasonable that he should have a right to recover either the specific ods, or else a satisfaction in damages, against all her persons who may have purloined or injured m. The degree of responsibility undertaken by bailee, and the species of diligence which he is und to use in the performance of the trust, will depend upon the specific nature of the contract. See Sir William Jones's *Essay on the Law of Bailment*; Blackst. *Comment.*; Jacob's *Law Dict.* (z)

BAILYBOROUGH, a market town of Ireland, in the county of Cavan, celebrated for a lake or pool on the summit of a mountain in its neighbourhood, remarkable on account of the antiscorbutic virtues of its water, and of the mud which is deposited at its bottom. The mud, which is a greasy substance like tar, is brought up from a depth of 30 feet, and rubbed on the parts affected. The water has a chalybeate taste, and is pure to the depth of about 6 feet. The temperature is said to suffer no change either in summer or winter. See Cootes' *Statistical Survey of Cavan*. (j)

BAIRAM, the *Greater* and the *Lesser*, the name of two annual festivals among the Mahometans. See Sale's *Koran, Prelim. Dissert.* p. 150. (j)

BAIROUT, or BAYREUTH, the *Berytus* of the ancients, a town of Syria, situated near the foot of Mount Lebanon, and remarkable only as being the emporium of the commerce of the Maronites and Druses, who export to it their cottons and silks, and receive in return rice, tobacco, coffee, and specie. These articles are again exchanged for the corn of the Bekaa, and no fewer than 6000 persons are employed in this commerce. A full account of this insignificant town will be found in Volney's *Travels in Egypt and Syria*, vol. ii. p. 187. (j)

BAITS. See ANGLING.

BAIT-EL-LAHAM, the name of the ancient Bethlehem. See Volney's *Travels*, vol. ii. p. 323, and BETHLEHEM.

BAITING. See BULL-BAITING.

BAKEWELL, called BADECANWYLLAM in the Saxon chronicle, is a market town in the hundred of High Peak, in the county of Derby, situated on the river Wye, near its confluence with the Derwent. The church is an elegant piece of architecture, with a lofty spire resting upon an octagonal tower. From several pieces of antiquity dug up in the neighbourhood, Bakewell seems to have been built in the time of the Romans. Near the town is a large cotton mill, erected by Sir Richard Arkwright, which gives employment to near 400 persons. Number of houses 280; population 1412, of which 523 are employed in trade. See the *Beauties of England and Wales*; and DERBYSHIRE. (Q)

BAKING, the art of reducing meal or flour of any kind, or any other substance, into bread. This art, simple and necessary as it may appear, does not seem to have been discovered till a late period in the history of mankind. The earlier nations knew no other use of their meal than to make of it a kind of porridge. Such was the food of the Roman soldiers for several centuries, or at most their skill proceeded no farther than to knead unleavened dough into biscuits or cakes. Even at present there are many countries where the luxury of bread is unknown. To bake it properly requires many precautions, and a degree of skill which can only be gained by considerable practice.

It is owing, perhaps, to this circumstance, that those who first began to pursue baking as a profession, have, in their several nations, been held in very high respect. At Rome, into which regular bakers

Baking, Baku.

seem to have been introduced from Greece, about the year of the city 583, they were so much esteemed as to be occasionally admitted into the senate. To preserve them more upright and honourable, they were expressly forbidden to associate with gladiators or comedians; and to enable them to devote their whole time to their proper business, they were exempted from guardianships and other offices to which the rest of the citizens were liable. To the foreign bakers who first practised this art in Rome, a number of freedmen were added, forming together an incorporation, or college, from which neither themselves nor their descendants were allowed to withdraw. Even their effects were held in common, and no part of them could be alienated. Each bake-house was under the superintendance of a patron, and one of the patrons was annually elected to preside over the rest, and take charge of the general concerns of the college. By the statutes of England, too, bakers are considered as superior to the general order of handicrafts. "No man," says the 22 Henry VIII. cap. 13. "for using the mysteries or sciences of baking, brewing, surveying, or writing, shall be interpreted a handicraft." In London, and indeed in most of the towns throughout the kingdom, they are under the jurisdiction of the magistrates, who regulate the price of bread, and have the power of fining those who do not conform to their rules. The two kinds of bread made in London are distinguished by the names of white, or wheaten, and household, which differ only in their degrees of purity. Every baker is liable to a penalty if he does not mark his loaves, according to their different qualities, with the letters W or H.

The ingredients of bread are flour, yeast, water, and salt, which are mixed according to the following process: To a peck of flour are added a handful of salt, a pint of yeast, and three quarts of water, which in hot weather must be cold, in winter hot, and in temperate weather lukewarm. The oven must be heated more than an hour before the bread is introduced, which must remain there three hours to be properly baked. The peck-loaf, whether household or wheaten, must weigh seventeen pounds six ounces avoirdupois, and smaller bread in the same proportion. Every sack of flour must weigh two hundred weight and a half; and from this there should be made, at an average, twenty peck loaves, or eighty common quartern loaves. Formerly if the bread was deficient only one ounce in thirty-six, the baker was liable to the pillory; and the same offence is now punished by a fine imposed at the will of the magistrates, provided it be not more than five shillings, nor less than one for every ounce wanting. Suspected bread, however, must be weighed before a magistrate within twenty-four hours after being baked; as its weight diminishes the longer it is kept. For further particulars concerning bread, and the substitutes used for it in various nations, see Bread. (*μ*)

BAKU, or Baccou, a sea-port town of the Caspian Sea, situated in the province of Schirvan in Persia. Although the entrance to the harbour is beset with shallows, islands, and sand banks, yet it is reckoned the safest in the Caspian, as ships can be moored head and stern, in seven fathoms of water, at the distance of forty fathoms from th
under the command of two strong bastion
town, which is said to have been built by the
is defended by a double wall, by strong r
and by a dry ditch, which can be filled in twe
hours with water from the adjoining mountai
the north and west of the town are several k
rugged mountains, with strong watch tow
upon their summits. The rock-salt, brimst
naphtha, which are found in the neighbour
Baku, are carried to Ghiland, Mazanderas,
surrounding countries. Saffron is also pro
great quantities. The trade of Baku is chi
ried on with Shamachy, from which they r
excellent red wine, and silks and silken stuffs

Among the curiosities in the neighbour
Baku, is what is called the *everlasting fire.*
ten British miles north-east of Baku, where
is dry and rocky, there are several small
temples, or arched vaults, about ten feet hi
posed to have been dedicated to fire. In one
where the Indians now worship, a large hol
is fixed to the ground near the altar, and
extremity of it issues a blue flame, more ge
that which is produced from spirits of win
the Indians suppose has burned since the fl
will continue till the end of the world. Fro
zontal gap on an adjoining rock, about 60
and three broad, there issues a blue flame o
lar kind. According to Gmelin, the soil is
marl mixed with sand, and effervesces wi
The following interesting account of the
springs is taken from Hanway's Travels, a
be given in his own words. The revenue aris
them to the Khan of Baku has been comput
less than forty thousand rubles.

"The earth round this place, for above t
has this surprising property, that by taking
or three inches of the surface, and applyi
coal, the part which is so uncovered im
takes fire, almost before the coal touches th
the flame makes the soil hot, but does not
it, nor affect what is near it with any degree
Any quantity of the earth carried to anot
does not produce this effect. Not long sin
horses were consumed by this fire, being und
where the surface of the ground was turned
by some accident took flame.

If a cane, or tube even of paper, be set a
inches in the ground, confined and close
earth below, and the top of it touched wi
coal, and blown upon, immediately a fla
without hurting either the cane or the pa
vided the edges be covered with clay; and
thod they use for light in their houses, w
only the earth for the floor: three or four
lighted canes will boil water in a pot, and t
dress their victuals. The flame may be exti
in the same manner as that of spirits of wi
ground is dry and stony; and the more s
particular part is, the stronger and cleare
flame; it smells sulphureous like naphtha,
very offensive.

Lime is burnt to great perfection by
this phenomenon; the flame communicatin

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any distance where the earth is uncovered to receive it. The stones must be laid on one another, and in three days the lime is completed. Near this place brimstone is dug, and naphtha springs are found.

The chief place for the black or dark goez naphtha is the small island Wetoy, now uninhabited, except at such times as they take naphtha from thence. The Persians load it in bulk in their wretched vessels, so that sometimes the sea is covered with it for leagues together. When the weather is thick and hazy, the springs boil up the higher; and the naphtha often takes fire on the surface of the earth, and runs in a flame into the sea, in great quantities, to a distance almost incredible. In clear weather the springs do not boil up above two or three feet: in boiling over, this oily substance makes so strong a consistence as by degrees almost to close the mouth of the spring; sometimes it is quite closed, and forms hillocks that look as black as pitch; but the spring which is resisted in one place breaks out in another. Some of the springs which have not been long opened form a mouth of eight or ten feet diameter.

The people carry the naphtha by troughs into pits or reservoirs, drawing it off from one to another, leaving in the first reservoir the water, or the heavier part with which it is mixed when it issues from the spring. It is unpleasant to the smell, and used mostly amongst the poorer sort of the Persians, and other neighbouring people, as we use oil in lamps, or to boil their victuals, but it communicates a disagreeable taste. They find it burn best with a small mixture of ashes: as they find it in great abundance, every family is well supplied. They keep it at a small distance from their houses, in earthen vessels, under ground, to prevent any accident by fire, of which it is extremely susceptible.

There is also a white naphtha on the peninsula of Apcheron, of a much thinner consistency; but this is found only in small quantities. The Russians drink it both as a cordial and a medicine, but it does not intoxicate: if taken internally, it is said to be good for the stone, as also for disorders of the breast, and in venereal cases and sore heads; to both the last the Persians are very subject. Externally applied, it is of great use in scorbutic pains, gouts, cramps, &c.; but it must be put to the part affected only: it penetrates instantaneously into the blood, and is apt for a short time to create great pain. It has also the property of spirits of wine, to take out greasy spots in silks or woollens; but the remedy is worse than the disease, for it leaves an abominable odour. They say it is carried into India as a great rarity; and being prepared as a japan, is the most beautiful and lasting of any that has yet been found. Not far from hence are also springs of hot water, which boil up in the same manner as the naphtha, and very thick, being impregnated with a blue clay; but it soon clarifies: Bathing in this warm water is found to strengthen and procure a good appetite, especially if a small quantity is also drank." East Long. 50° 2', North Lat. 40° 21'. See Hanway's *Travels*, vol. i. p. 263; Kæmpfer, *Amœnitates Exoticæ; Mem. Acad. Berlin*, 1756; and *Decouvertes des Russes*, vol. ii. p. 213. (*o*)

BALA, a town in the county of Merioneth in North Wales, situated on the east end of a large lake called Bala-Pool, or Pimblemere. The town is clean and pretty large; the single street, of which it consists, is wide, and the houses generally low. A considerable trade is carried on in fruit, stockings, gloves, and flannels. The antiquity of the town is manifest from the remains of three Roman camps, which seem to have been used as exploratory stations before the subjugation of the Ordovices. Bala-Pool is about 1200 yards broad, and four miles long. It produces fine trout, perch, and the gwyniad, an Alpine fish, from one to six pounds weight, which resembles a salmon in shape, and a trout in taste, and dies the moment it is taken out of the water. The river Dee, which runs into the lake, is said to pass through it without mingling its waters with those of the lake. Number of houses, 310. Population, 1463. See Aikin's *Journal of a Tour through North Wales;* and a *Tour in Wales, &c. in* 1805, p. 127, 129, *in* Philips' *Collection of Voyages, &c.* vol. iv. (*o*)

BALAAM, a famous prophet, or soothsayer, whose history may be found in the book of Numbers, particularly in the 22d, 23d, 24th, and 31st chapters. Referring to the sacred record, for all the particulars which are known of his life, we shall content ourselves with offering a few observations, with a view to elucidate this curious, but difficult part of scripture history. For this purpose, we shall consider his place of residence, his character, and his conduct.

He is said to have dwelt at *Pethor*. "Balak sent messengers unto Balaam to Pethor." *Num.* xxii. 5. Now Pethor signifies *to interpret;* and hence it is translated in the Vulgate, *Hariolum*, a soothsayer. The termination in the original, however, evidently denotes locality, and therefore the word is generally understood as pointing out the residence, rather than the designation of Balaam. Pethor is said to be on the other side of the river to the south, beyond the borders of Moab, and seems to agree, both in name and situation, with Petra, in Arabia. There was, probably, a college of priests settled in this place, over which Balaam presided; and from this circumstance it derived its name, signifying literally, *the place of interpretation.* There can be little doubt, that Patara, in Lycia, where there was a famous oracle of Apollo, hence called Patareus, derived its name from the same Hebrew original; and hence also the priests of Apollo, and the interpreters of the oracles, were called Pateræ. *Pateræ sacerdotes Apollonis, oraculorum interpretes.* Bochart. *Canaan.* l. 1. c. [illegible]

As to the character of Balaam, it has been disputed whether he was a prophet, and worshipper of the true God, or merely an uninspired diviner, or soothsayer, who prophesied according to the rules of augury, and vaticination, in use amongst the heathen nations. That he was not of the seed of Abraham, is certain; that he was not a righteous man, is equally certain; but we are not so sure that these circumstances disqualified him from being a real prophet. It is evident that the knowledge of the true God, in these early times, was not confined to the descendants of Abraham. If the book of Job contains the history of real events, as we are inclined to think it does, It is a proof that God revealed himself to other nations as well as to the Jews; for neither Job nor his friends were of the family of Israel. Jethro, the priest of Midian, also, had the knowledge of the true God. We need not be surprised, then, that Balaam, who was of the same country, should possess the same knowledge. If holiness be essential to the character of a prophet, Balaam's qualifications must indeed appear very doubtful. But it is evident from scripture, that the persons possessing the prophetic spirit, were not always distinguished by integrity and uprightness. We have a remarkable instance of this, in the conduct of two prophets, as recorded in the 13th chap. of the first book of Kings. Saul himself was, for a time, among the prophets: Caiaphas, the high-priest, who joined in the persecution of our Lord, had a sudden impulse of the prophetic spirit: and some wicked prophets are represented as saying at the day of judgment, "Lord, have we not prophesied in thy name?" Balaam, then, it appears, must be added to the number of those, who have sometimes been favoured with the spirit of prophecy, without always possessing the spirit of holiness.

With regard to his conduct, it does not appear, at first sight, what it was that rendered it so offensive in the sight of God. A little attention to the narrative, however, and to some subsequent intimations of scripture, will enable us sufficiently to explain it. Balak, king of Moab, sent to entreat him, that he would come and curse Israel. Upon this he consulted God, who said, "Thou shalt not go with them." The messengers therefore returned to Balak, who immediately dispatched others more honourable, and empowered them to make him the most flattering offers. Though strongly inclined to comply, yet he did not dare to disobey the positive command of God. He therefore consulted again, and received this instruction: "*If the men come to call thee*, rise up and go with them." Upon this we are informed, "Balaam rose up in the morning, and saddled his ass, and went with the princes of Midian; *and God's anger was kindled because he went*." The difficulty which this passage presents, will be solved at once, if we adopt Shuckford's translation: "God's anger was kindled because he went of himself." The meaning then would be, that Balaam had not waited till the princes of Midian called him in the morning, as he had been directed to do, but had abused the conditional permission which God had given him, by officiously offering to accompany them before he had been again solicited. This is the usual explanation of the passage, and may certainly be fairly inferred from the words in which it is expressed; or it may be, that God was offended because he went with a bad intention. That Balaam went with a disposition to curse, rather than to bless the children of Israel, is evident from what the angel says to him, "I went out to withstand thee, because thy way is perverse before me." It appears also, that he industriously sought for evil omens against Israel, and shifted his position several times, that he might, if possible, catch an unfavourable aspect, and pronounce that malediction which the king of Moab so earnestly desired. "But when he saw that it pleased the Lord to bless Israel, he went not, as at other times, to seek for enchantments," *Numb.* xxiv. i. His hostility to Israel is also clearly proved, by the counsel which he afterwards gave to the Midianites. Finding himself restrained from cursing Israel, he advised the Midianites to seduce them, if possible, into idolatry. This stratagem was but too successful: the Israelites, however, soon returned to the service of God; and, when they avenged themselves on Midian, they slew Balaam with the edge of the sword, as the chief author of their sin and of their calamities, *Numb.* xxxi. 1.

Much has been said on the subject of the ass, and it has often excited the sneers and ridicule of sceptics and unbelievers; but if they had half the sense of Balaam's ass, they would not subject a miraculous event to the ordinary rules of ratiocination. If we admit the possibility of miracles at all, an ass speaking is neither more astonishing, nor less possible, than any other deviation from the laws of nature. Maimonides, however, and almost all the Jewish writers, suppose the whole of this scene to be an allegory, or a vision. Balaam indeed says, that "he saw the vision of the Almighty, falling into a trance, but having his eyes open;" but we cannot be sure that this applies to the particular scene of which we are speaking. St Peter seems to favour the literal interpretation: speaking of Balaam, he says, "the dumb ass, speaking with man's voice, forbade the madness of the prophet;" 2 *Pet.* ii. 16. See Shuckford's *Connections*, vol. iii. p. 312. Calmet's *Dictionary*. Bryant's *Mythology*, vol. i. p. 310. Parkhurst's *Lexicon*, on the word *Pethor*. (*g*)

BALACLAVA, a sea-port town of Tartary, formerly Symbolon and Cembalo, is situated on the south side of the Crimea. This town appears to have been founded by the Greeks, and afterwards re-peopled by the Genoese; but being deserted by them, and having fallen into ruins, has now reverted to its original inhabitants. The port, which is situated to the west of the town, is about a verst long, and two hundred toises broad, and is sufficiently deep to receive vessels of the largest size. Being protected from every wind by high mountains, the water is always perfectly calm. The entrance to the south is so contracted by high rocks, that it is impossible for two vessels to pass together, without running foul of each other. Dangerous as this entrance appears, the harbour has been gladly made by vessels driven upon the peninsula, which could not double the point of Chersonesus. The port, however, is shut against ships of all nations, from the fear of contraband trade, which, by less cruel means, it would be easy to prevent.

The garrison is ordered to fire upon all vessels, even those belonging to the crown, which attempt to enter the harbour. These severe measures have consequently occasioned a great number of shipwrecks. In the year 1802, no fewer than four ships, in great distress, begged in vain for shelter. They struck opposite the monastery of St George, and the crew and cargo of two of them were entirely lost. The old Genoese fortress is situated at the entrance of the port, upon a high mountain to the east, defended by lofty walls and towers. The town is well peopled, and its position in the centre of the peninsula makes it a place of considerable trade. The population, con-

'artars, Greeks, Jews, Russians, and Ar-
nounts to 3000. East Long. 31° 24',
44° 38'. See Reuilly's *Travels into the*
d along the Shores of the Black Sea, in
. vi. (x)

NA, in Zoology, the whale, a genus of
as animals, which in the Linnæan system
order Cete of the class Mammalia, but
od of Ray, and the system of Lacépède,
a tribe of cetaceous fishes. See Ceto-
)

NOPTERA, a subdivision of the whale
d into a new genus by Lacépède, and in-
ee species, distinguished from the balænæ
ongitudinal folds under the throat and
lorsal fins. See Lacépède, *Histoire Na-*
Cetacées, p. 120; and *Dictionnaire des*
aturelles, tom. iii. p. 442. (*f*)

LAVA. See Balaclava.

NCE, the name of a simple machine for
the weight of any body, or for finding a
any substance equal to a given weight.
e has generally been arranged among the
powers, but it is evidently only a particu-
of the lever in which the two arms are
n which there will be an equilibrium when
nd weight are equal.

nce consists of a horizontal beam, which
d an axis or centre of motion exactly
le of the beam. The two halves of the
ach side of the axis, are called the arms
nce. From the two extremities of the
d the *points of suspension*, are hung two
ne of which is placed the substance to be
nd in the other are placed weights of a
gnitude. The equality of the weights in
les, or the perfect equilibrium of the ba-
own from the horizontal position of the
the common balance, where the whole
uspended from the axis of motion, a slen-
lled the tongue of the balance, rises per-
y from the centre of the beam, and points
ular part of the handle by which the
pended when the beam is horizontal.

es where very great accuracy is required,
not supported by suspension, but has a
steel for its axis, which rests upon steel
e horizontal position of the beam is in
termined, by observing when the extremi-
rms point to the zero of two ivory scales
mahogany frame in which the instrument
he line joining the two zeros having been
laced in a horizontal position, by levels
mahogany frame. The beams of these
ances sometimes consists of a plain cylin-
f a double cone, whose vertices form the
spension, or of a frame in the form of a

ucting an accurate balance, it is necessary,
two points of suspension, and the axis or
tion, should be *in the same straight line*.
of any weight in turning a lever round
is proportional to the perpendiculars let
e fulcrum upon a vertical line passing
points of suspension. When the points of suspension, therefore, and the centre of motion, are not in one line, the perpendiculars let fall upon the vertical lines are equal only when the line joining the points of suspension is truly horizontal. In every other position, the perpendiculars will be unequal, and there will not be an equilibrium between equal weights. When the points of suspension and the centre of motion, however, lie in the same straight line, the perpendiculars upon the vertical lines must be equal, in every position of the beam, and there will always be an equilibrium between equal weights, the beam being supposed without weight. 2. *The points of suspension must be precisely equidistant from the centre of motion*, or, what is the same thing, *the arms of the balance must be exactly of the same length*. It is obvious, that when the arms are unequal there cannot be an equilibrium between equal weights, as the one weight acts at the extremity of a longer lever than the other. 3. *The centre of gravity of the beam should be placed a little below the centre of motion*. If the centre of gravity of the beam coincides with the centre of motion, the beam will rest in any position in which it is placed, whether it is unloaded or loaded with equal weights. If the centre of gravity is above the centre of motion, the beam will be overset by the slightest disturbance. But if the centre of gravity is below the centre of motion, the beam will not rest in any but a horizontal position, and when disturbed will recover this position with a degree of facility proportioned to the distance between the centres of motion and gravity. The nearer, therefore, that the centre of gravity is to the centre of motion, the more easily will the equilibrium be disturbed, and consequently the more delicate will be the balance. 4. *The beam should be as light as possible, but at the same time so strong as not to change its form when the scales are loaded to a maximum*. It is evident, that the friction upon the centre of motion will be diminished by the lightness of the beam, and that the inertia of a light beam will be more easily overcome by a small weight than the inertia of a heavy one.

Balance.

Having thus stated very briefly the precautions that are necessary in the construction of a delicate balance, we shall proceed to describe three of the best balances that have yet been made. The two first were made by the celebrated Mr Troughton, and the last by Messrs Miller and Adie, mathematical instrument makers, Edinburgh. (*o*)

Troughton's balance.
Plate LI.
Fig. 1.

In Figure 1. AB represents the scale-beam in its most perfect state, as made by Mr Troughton. A strong mahogany box contains the whole; it has drawers below for holding weights, &c.; and a long one behind, wherein the beam is packed, when out of use or in carriage. There are doors in the ends through which the pans, or scales, are loaded and unloaded, and through another at the top the beam may be taken out. The front and back are of plate glass. On the upper surface of the drawer department are shewn two spirit levels, L, L by means of which, and screws below, the balance is easily adjusted to its due position. There passes through the box, a little below the levels, an iron rod, having at each end a handle, by which it may be turned round. One of these is seen in the figure at H. This rod moves two pinions concentric with itself, and within the box, which act on props P, P that support the pans, or allow their motion as business may require. A strong brass pillar F occupies the centre of the interior of the box, supporting at top a square platform; on the front and opposite side of this are erected two arches *m*, *m* nearly semicircular; and, on their vertices, are fixed two horizontal planes of agate, which afford together the proper fulcrums for the beam. Within the pillar F a cylindric tube is elevated or depressed by a lever, the handle of which is seen at G between the drawers below: from the upper end of the tube, just above the platform, springs an inverted arch *n*, of as much greater radius than the other two which it crosses at right angles, as brings its span on the outside of them. The beam is formed of two hollow cones of brass joined together by a short cylinder in the middle, and is altogether about 18 inches long. These are formed of a substance not exceeding 0,02 of an inch thick, but, by means of circular rings driven hard into them at proper intervals, are rendered almost inflexible. The beam is crossed in the middle of its length by a cylinder of steel, the lower diameter of which coincides with its centre. The lower side of this cylinder being reduced to an edge, the angle of which is about 30°, hardened and well polished, forms the principal axis, and rests through a length of about 0,05 of an inch, before and behind, upon the agate planes. Exterior to the parts of action, the axis is worked into two small pivots; and the extreme ends of the inverted arch being formed into angles, the latter when lifted up by the lever below, carries with it the beam, and thus relieves the axis when the instrument is out of use. On lowering the beam, the angles leave the axis in its proper position on the centres of the planes. There being no contrivance to prevent the axis from wandering from the centres of the agates, when this is seen or suspected, the beam must have its position rectified by means of the inverted arch. A weight for adjusting the motion of the beam, respecting the time in which it performs its vibrations, is raised or lowered by a screw at top: its mean position is the centre of the beam. The points of suspension for the scales are both adjustable, the one on the left horizontally, for making the arms of the balance of equal length: the axis is here fixed in a piece which is pushed inwards by a screw, while a strong spring of coiled wire, in the inside of the cone, presses it in an opposite direction. The axis on the right is adjustable vertically, for the purpose of bringing the three points of action into a right line: this is brought about by fixing the axis in a sliding piece similar to the other, and it is acted on by two screws which press it in opposite directions. The action at the ends, like that at the centre, is on double bearings; but, instead of by two sharp edges resting upon two planes, is here performed by two concave edges acting at right angles on two other concave edges: the former pair formed in the axis itself being sharp upwards, and the latter pair sharp downwards, formed in the spur shaped pieces from which the scale-strings depend. The ends of the beam terminate in points, and play contiguous to divided ivory scales, which are fixed in the inside of the box: the value of these divisions is indefinite, and varied at pleasure by the adjusting

Plate LI.
Fig. 2.

weight: they are, however, of great use in est
small quantities. For hydrostatical purpose
are only required to be added a common t
of water, and a brass wire hooked at both en
set of accurately adjusted grain weights usu
company the instrument; and, perhaps every
considered, the following series may be as con
as any:

,001	,01	,1	1	10	100	1000
,002	,02	,2	2	20	200	2000
,004	,04	,4	4	40	400	4000
,008	,08	,8	8	80	800	8000

Greater weights than these might endanger th
of action.

The following instructions how to adjust th
of balance may not be unacceptable. 1st, T
the three points of action into a right line. W
weights, poise the beam by throwing into th
any bits of light substance, and raise or lo
weight within the beam until the vibrations ar
by rendered very slow: now, put weights i
pans, equal to about half the greatest load yo
your instrument to carry, so that the beam
poised again: if it now vibrates slow just a
before, it proves the adjustment to be perfec
in case it either oversets or vibrates too quic
must restore it to slow motion by the a
weight, noting the number of turns of the scr
parts of a turn, which were required to produ
motion: now, turn the screw the contrar
through double the noted quantity, and then
the required slow motion by the proper adj
at the right end of the beam. Repeat the op
until the adjustment is perfect. 2d, To m
arms of the beam of an equal length. With
in the scales as in the last adjustment, poise th
with the greatest care: now take off the sc
unhooking them, and hang them into contra
of the beam, which if now poised, the thing i
but, if not, take as much hair or wire as wh
into the apparently lighter scale, will restore
lance: take away half of it (which is accuratel
by doubling and cutting), and poise the b
the proper adjustment at the left end. Rep
operation also for greater certainty. The a
the two grand adjustments of the balance: se
ones, (as poising the beam itself, is done by
screwing in or out a small screw at the rig
and equalising the pans and hook for weig
water, which is done by scraping off a little
substance,) can only require to be enumerated.
the instrument is adjusted in all its parts, the
ing weight may be moved up or down at
according as exactness or dispatch may be re

In Figure 4. of Plate LI. is represented
beam of the common form, such as is used
saying of metals, or nice chemical purposes, i
a load greater than 4 ounces is not required.
quires to be inclosed in a glass case, and is su
upon a pillar. A tube inside the pillar is
by a lever below, and connected with a squ
form and two semicircular arches at top:
summit of each of these arches is fixed an ob
gle of hardened steel, which, supporting the
cute angle of the axis, forms the principal pa

tion. The circular ends of the beam are excavated in the middle of their thickness, on the lower side, a good deal above the centre: the axis is fastened in the two sides of the circular ends, with its sharp edge upwards a little concave, having passed through a piece of hardened and polished steel of the shape of an 8; the inner edges of the two eyes being worked to sharpness: by the upper eye it hangs upon the axis within the part excavated, forming the point of suspension, and with the lower the scale-strings are connected by a ring. A piece of wire extending above the centre is worked into a screw, and upon this an adjustable ball of brass is placed for the purpose of procuring quick or slow vibrations. Opposite to this, extending downwards, is a long index pointing to a graduated scale of ivory for ascertaining the position of the beam. The lever below is fixed to the pillar, and by its action lowers the beam until the pans rest upon the bottom of the glass case, or raises it when in use. At the top of all there is a light index of brass-wire, which, by being turned round with the finger, serves to adjust the index below to the zero of the ivory scale: this, insignificant as it appears to be, is extremely convenient in practice. This kind of beam is adjusted, respecting equality of length in the arms, by the hammer, and bent by the hand for bringing the three points of action into a right line. (E. T.)

An ingenious balance constructed by Messrs Miller and Adie for Mr Jardine, is represented in Fig. 1. of Plate LII. where AA is the beam forged of one piece of steel, which, in order to give greater strength with lightness, has the form of a rhombus, whose acute angles coincide with the centres of suspension B, B. The ends of the arms pass through the pieces C, C, which are hollow, to receive the two rings D, D, from which the scales are suspended, and terminate in slender points, which serve as indexes to point out the inclination of the balance on the ivory arches EE. The axis or centre of support f is about [illegible] inches long, 1 inch deep, and three inches thick. Its under edge, worked away to form a right angle, passes through a box g in the middle of the beam, and is fixed in its place by 10 small steel screws. The edge of the centre turns on hard and highly polished steel plains h, from which it is lifted, when not used by Y's, which are moved up by turning the pinion I, which works in a rack within the hollow brass pillow that forms the stand for supporting the balance. Fig. 2. shews the pieces C, C on a large scale, that the different parts may be more distinctly seen. The rings D, D, which are hardened and well polished, are just allowed to move freely between the four hardened steel points screwed through the sides of the pieces C, C. One of the end centres C is fixed, and the other is made to move in a slit to or from it, by the four adjusting screws k. The balance is inclosed in a mahogany case with a glass front, to the back of which is attached the brass frame L, moveable up or down by a rack and pinion M, so as to stop the scales, and thus check the vibration of the balance when in use. The cross levels N on the bottom of the pillar, are intended to adjust the plains on which the centre turns, to a true horizontal position, by means of the four screws O, that form the feet of the mahogany case. In performing the adjustments of the balance, we must begin by placing the edges of the three centres in a straight line as nearly as possible, by pressing down the centre f with the two screws p, which, if lower than the centres of suspension, will be known by the balance preponderating to either side. In order to adjust the centre of gravity, so as to be just under the centre of support, the rings must be removed from the ends of the beam and the slider q, and moved up as long as the beam will librate. When it is too high, either end of the beam on being depressed, will remain in that situation. We must next try if the arms have equal lengths, by replacing the rings and suspending the scales, and then putting equal weights into them. If the balance now remains in equilibrium, the adjustments are complete; but if either side preponderates, that arm is longer than the other, and the moveable centre must be altered accordingly by the screws k. The previous adjustments must now be repeated, as every alteration, in a delicate balance, in a greater or lesser degree affects all the others, so that they can only be attained by approximation. A balance of the above construction, which we have tried, was sensible to $\frac{1}{100}$ of a grain, when loaded with 10,000 grains in each scale. (Y)

For further information on the subject of balances, see De La Hire, *Mem. Acad. Par.* tom. ix. p. 42. Roberval, *Mem. Acad. Par.* tom. x. p. 343. Euler, *Comment. Petrop.* tom. x. p. 3. Magellan, in Rozier's *Observations*, tom. ii. p. 253. tom. xvii. p. 44, 432. Ramsden, in Rozier's *Observat.* tom. xl. p. 432. Shuckburgh, *Phil. Trans.* 1798, part ii. Nicholson's *Chemistry*, chap. vi. Ludlam, *Phil. Trans.* vol. lx. 1770, p. 205. Ludicke, in Gilbert's *Journal*, vol. i. p. 323. Andrews, *Repertory of Arts*, vol. xi. p. 16. Prony, *Annales de Chimie*, vol. xxxvi. p. 3; and Nicholson's *Journal*, vol. v. p. 313. Guyton, *Annales de Chimie*, vol. xlii. p. 23. Atwood, Gilbert's *Journal*, vol. iv. p. 148. Dillon, *Mem. de l'Institut. Nat.* tom. iv. Ferguson's *Lectures*, vol. ii. p. 385. See also HYDRODYNAMICS, MECHANICS, and SPECIFIC GRAVITY. (*o*)

BALANCE, HYDROSTATICAL. See HYDRODYNAMICS.

BALANCE, TORSION, invented by Coulomb. See TORSION.

BALANCES IN TIMEKEEPERS. See CHRONOMETERS.

BALANCERS. See ENTOMOLOGY.

BALANTES, the name of a tribe of negroes, who inhabit a tract of country about 10 or 12 leagues long, to the north of the isle of Bussi, in West Lon. 17° 10′, and South Lat. 11° 45′. The Balantes have no intercourse whatever with their neighbours. They carry on a considerable trade with the foreigners who enter their roads, in rice, millet, culinary vegetables, oxen, goats, poultry, and particularly gold. The gold, which is of a very superior quality, is supposed to be obtained from mines in the interior of the country. They pay a tribute in gold to the king of Casamanca. In 1696, the Portuguese, joined by 300 Bissaux, attacked the Balantes, but were completely defeated, and lost the whole of their baggage. Several Europeans, who have landed among the Balantes with commercial views, have been plundered and assassinated. See Durand's *Voyage to Senegal*, chap. vi. (*j*)

BALANUS, in Zoology, a genus of testaceous *mollusca*, in the works of Cuvier, and some other continental naturalists, distinct from the tribe LEPAS, under which they are arranged by Linnæus. See CONCHOLOGY, and MOLLUSCA.

BALASORE HANDKERCHIEFS. A species of the cotton manufacture, in which the Indian fabric is imitated, and the name preserved. To those who are conversant with the general manufacture of muslins, the Balasore handkerchief will present little novelty. The fabric is similar to that of the *Jacconott muslins*, which are of an intermediate degree of closeness between the most dense and the lightest. The border of the handkerchief is formed in general merely by using coarser yarn than the body of the fabric; and this yarn may be so disposed, as to form many different patterns. The texture is merely plain or alternate; and the only additional care which it is incumbent on the weaver to use, is that of rolling his cloth when finished on the receiving beam. When a piece of these handkerchiefs is newly begun, very little difference of tension will be perceived, but as it proceeds, the difference always increases, and it very soon becomes necessary that it should be counteracted, or the whole fabric would be inevitably injured. The cause of this is the accumulation of the coarser and more bulky material near to each selvage of the cloth. As the coarse warp occupies a greater space than the fine, it follows that at every successive convolution, the diameter of the beam must increase in a greater ratio than the former. Again, as the tension of the warp is preserved by the action of the warp and cloth beams in contrary directions, it necessarily follows, that the ratio of tension must depend upon the measure of each diameter; but as by successive convolutions, the diameter of that part where the borders are wound becomes progressively greater than that which is occupied by the intermediate cloth, the tension of the coarse warp is rapidly increased by the augmentation of the cylindrical measure of the beam. Hence the coarse boarders would be burst asunder by excessive tension, before the bosom of the handkerchief had acquired so much as would moderately stretch the warp. To counteract this, layers of paper, or pasteboard, and sometimes small slips or rods of wood, are cut, so as to fill the bosom, and wound upon the beam between the folds of cloth. By the thickness of these being added to that of the cloth, the accumulation upon the beam is kept pretty nearly equal in all parts, and the defect is in a great measure removed. The fabric of the Ballasore handkerchief being nearly the same as the Jacconott, N° 60, 62, or 64, may be taken as an average set for a 1200 reed, and the different gradations for finer or coarser reeds will be found by the rules laid down in that article. Some allowance, however, must be made for the finer fabrics, or they will appear much more dense than is generally desirable. The reason of this is also pointed out in that article. The difference being merely matter of taste, cannot be exactly specified. By the calculation for a 1500 reed, N° 100 would be required. Now in common practice, N° 110 may be considered pretty near the general standard; so that the difference is bers. For a 1000, N° 45 would be take calculation, and this is very near the usual

In warping the coarse yarn for the bor ferent plans are used. It is sometimes wa rately, and beamed at either side of the fi crossed over it obliquely before it comes to At other times, it is warped along with The coarse yarn is sometimes doubled, t bolder appearance in the cloth, at other tim number of threads, as four, and sometime crowded into the same interval of the re latter produces much the finest appearan vastly more troublesome to the weaver; fo many threads are confined in one space, th becomes very great during the alternate sinking of the warp; and every small k struction of any kind, produces much inc both in the warp and woof.

Coloured or dyed yarn is also frequentl the borders of these handkerchiefs, and m posed exactly as the common Balasore bor this species, although it is not necessary th ference of fineness should be so conspicuou white handkerchiefs, where the whole app given by superior density; still the dyed y to be very considerably bolder than the bo web, that the colour may appear cons through the intervals of the woof. When borders are composed of single threads of many threads are crowded together in the terval of the reed, they appear to very gr tage, because the weft covers so little of t ed yarn as hardly to produce any perceptib tion of the effect; but for the reasons forme they are excessively troublesome to the w ring the operation. When cords are used, culty is still further increased, although th judiciously disposed, greatly heighten the and appearance of the border. Balasore chiefs are sometimes checked through th either with cording or coarse yarn, and the borders are also frequently checked. The only peculiarities of this fabric, which, in e respect, is merely a piece of plain Jaccon (J. D.)

BALBEC, a town of Syria, celebrat magnificent ruins. It is delightfully situa foot of Anti-Libanus, in that part of th commonly called Cœlo-Syria. The tow rounded by a wall, of about four miles in rence, according to Pococke, and the mis vels of the natives form a striking contrast nerable remains of ancient architecture. object which arrests attention is, the rui Temple of the Sun, which, even in its p lapidated state, exhibits the magnificence deur of the original design. The principal has been particularly admired for the bea workmanship. The transverse-stone at t adorned with the figure of an eagle, most ly sculptured, holding in his claws a cadu in his beak a large wreath of flowers, w down on each side, till it terminates in two winged figures, which appear as supporte

Balbec.

e bird is supposed to be an emblem of
whom this temple was dedicated; and
ged figures are supposed to represent the
the air. We must content ourselves
a very general account of these inter-st-
s it will be impossible to render a minute
intelligible, without the assistance of
ferring, therefore, the lovers of the arts
l's splendid work on *The Ruins of Balbec*,
efly adopt the account of M. Volney, the
r who has particularly described these
ging it as much as is consistent with per-
n entering the principal gate, which faces
n on the east, we come into a hexagonal
h is one hundred and eighty feet in dia-
is is strewed with broken columns, muti-
ls, and the remains of entablatures and
round it is a row of ruined edifices, which
he ornaments of the richest architecture.
through this court, towards the west, we
e square, three hundred and fifty feet
three hundred and thirty-six in length.
side of this court, runs a sort of gallery,
various compartments, seven of which
oned in each of the principal wings. It
to conceive the use of this part of the
but this does not diminish our admiration
y of the pilasters, and the richness of the
tablature. Neither is it possible to avoid
he singular effect which results from the
the garlands, the large foliage of the ca-
the sculpture of wild plants with which
ry where ornamented. At the west end
t, stand six enormous columns, which ap-
otally unconnected with the rest of the
On a more attentive examination, how-
scover a series of foundations which seem
t the peristyle of a grand temple, to
columns belonged. Pococke supposes
mple never was finished. We must exa-
narrowly before we can conceive all the
the elevation, and the richness of their
p. Their shafts are twenty-one feet
in circumference, and fifty-eight feet
t the total height, including the entabla-
seventy-one to seventy-two feet. These
e all that now remain of fifty-four.
hern side of the grand temple has, at
t period, been blocked up to build a
the peristyle and walls of which are still
This temple presents a side of thirteen
eight in front, which, like all the rest
are of the Corinthian order: their shafts
eet eight inches in circumference, and
height. We can form no idea of the
formerly covered this temple, except
gments which lie scattered amongst the
are to be found in the form of lozenges,
e represented Jupiter seated on his eagle;
ng her swan; Diana with her bow and
.
s visited, in 1751, by Mr Dawkins and
the latter of whom has given a set of
l and splendid drawings of the ruins.
lso visited Balbec, and made numerous

drawings, which he presented to the king, and which he boasts of being the richest offering of the kind ever presented by a subject to his sovereign: if, indeed, they are in the style of Mr Bruce's other drawings, they must be very excellent. A great many plates of the ruins may also be found in Pococke. Several changes have taken place since the journey of Messrs Dawkins and Wood. Such a continual system of barbarous dilapidation is carried on, that perhaps at no very distant period, travellers will be forced to say, *Etiam periere ruinæ.* The truth of this observation is confirmed by the words of M. Volney. "They (Dawkins and Wood) found nine large columns standing, and, in 1784, I found but six. They reckoned nine-and-twenty at the lesser temple, but there now remain but twenty. The others have been overthrown by the earthquake of 1759. It has likewise so shaken the walls of the lesser temple, that the stone of the soffit of the gate has slid between the two adjoining ones, and descended eight inches; by which means the body of the bird sculptured on that stone is suspended detached from its wings, and the two garlands which hung from its beak, and terminated in two genii. Nature alone has not effected this devastation: the Turks have had their share in the destruction of the columns. Their motive is to procure the iron cramps, which serve to join the several blocks of which each column is composed. These cramps answer so well the end intended, that several of the columns are not even disjointed in their fall; one among others, as Mr Wood observes, has penetrated a stone of the temple wall without giving way. Nothing can surpass the workmanship of these columns: they are joined without any cement, yet there is not room for the blade of a knife between their interstices. But what occasions more astonishment, is the enormous stones that compose the sloping wall, which surrounds the temple on the west and north. To the west, the second layer is formed of stones which are from twenty-eight to thirty feet long, by about nine in height. Over this layer, at the north-west angle, there are three stones, which alone occupy a space of one hundred and seventy-five feet and a half; viz. the first fifty-eight feet seven inches, the second fifty-eight feet eleven, and the third exactly fifty-eight feet long, and each of these is twelve feet thick. There is still lying in a quarry in the adjacent mountain, a stone, hewn on three sides, which is sixty-nine feet two inches long, twelve feet ten inches broad, and thirteen feet three inches thick.

"When we consider the extraordinary magnificence of the temple of Balbec, we cannot but be astonished at the silence of the Greek and Roman authors. Mr Wood, who has carefully examined all the ancient writers, has found no mention of it except in a fragment of John of Antioch, who attributes the construction of this edifice to Antoninus Pius. The inscriptions that remain corroborate this opinion, which perfectly accounts for the constant use of the Corinthian order, which was not in general use before the third age of Rome: but we ought by no means to allege as an additional proof, the bird sculptured over the gate; for if his crooked beak, large claws, and the caduceus he bears, give

Balbinus, Balboa.

him the appearance of an eagle, the tuft of feathers on his head, like that of certain pigeons, proves that he is not the Roman eagle: besides, the same bird is found in the temple of Palmyra, and is therefore evidently an oriental eagle, consecrated to the sun, who was the divinity adored in both these temples. His worship existed at Balbec, in the most remote antiquity." Mr Wood supposes that Balbec, or rather Balbeth, which signifies in Hebrew, *the city of Baal*, or the sun, had its name from the worship of this deity. It was literally translated *Heliopolis*, or the city of the sun, by the Greeks. There can be no doubt that Balbec is the ancient name, which has again recovered its place after it had been expunged by the Greeks: in the same manner as Tadmor, by which alone Palmyra is known by the Arabs, is undoubtedly the ancient name of that place. The Greeks have confounded both geography and history, by translating the names of places into their own language, instead of giving them their proper unalienable appellations. We know nothing of the state of Balbec in remote antiquity, but as it lies in the road between Tyre and Palmyra, it probably shared the commerce of these opulent cities. It was a garrison town in the time of Augustus; and we read of its garrison being strengthened by the emperor Heraclius, that it might be enabled to withstand the Arabs. On the wall near one of the gates, there is a Latin inscription, in Greek characters, still very legible, viz. *Kenturia prima*, evidently marking it out as a Roman station. When Christianity gained the ascendancy under Constantine, part of the temple was converted into a Christian church, a wall of which is still remaining.

When describing the temple of Palmyra, M. Volney says, "It is a remark worthy the observation of historians, that the front of the portico has twelve pillars, like that of Balbec; but what artists will esteem still more curious is, that these two fronts resemble the gallery of the Louvre, built by Perrault, long before the existence of the drawings which made us acquainted with them; the only difference is, that the columns of the Louvre are double, whereas those of Balbec and Palmyra are detached. The population of Balbec was estimated at five thousand, in 1751; in 1784, it did not exceed twelve hundred." See Volney's *Travels in Egypt and Syria*, vol. ii. Pococke's *Travels*, vol. ii. Wood's *Ruins of Balbec*. Bruce's *Travels*, introduction. (*g*)

BALBINUS, one of the Roman emperors. See Crevier's *Hist. Rom. Empire*, vol. viii. p. 382; and Gibbon's *Hist.* chap. 31. (*w*)

BALBOA, Vasco Nugnes de, one of the celebrated Spanish adventurers, who, at the beginning of the 16th century, repaired to the New World in search of opulence and fame. He was the first who landed on the continent of South America. He received information that there was a mighty and opulent kingdom situated in the interior, and he transmitted an account of this important news to Ferdinand of Spain. The Spanish king, regardless of the claims of Balboa, appointed Pedrarias Davila to supersede him in the government of Darien, and provided him with 1200 soldiers, and a well equipped fleet. No sooner had the new governor assumed his office, than dissensions and sickness conspired to ruin the colony. Balboa sent remonstrances to the court of Madrid, and Ferdinand, sensible of his own imprudence, appointed Balboa lieutenant-governor of the countries in the South Sea. The animosities between Pedrarias and Balboa were now reconciled, and their friendship was cemented in 1515, by the union of Pedrarias' daughter with Balboa. Pedrarias, however, still harboured resentment in his breast; and having arrested Balboa, he accused him of disloyalty to the king, and of a design to revolt against the governor. Balboa was condemned to death, and, in spite of the ardent intercessions of the whole colony, he was executed in 1517, in the 42d year of his age. See Robertson's *Hist. of America*, p. 276. (*j*)

BALCASH. See Balkash.

BALD Eagle Valley, or *Sinking Spring Valley*, the name of a delightful valley, about 5 miles wide, on the frontiers of Bedford County, in Pennsylvania. Its bottom is limestone; lead ore and slate abound in its vicinity; and it exhibits strong marks of pit-coal. This valley is remarkable for a phenomenon called the swallows, which absorb several of the largest streams, and discharge them again on the surface, after a subterraneous passage of several miles. What are called the "arch springs," is a deep hollow about 30 feet wide, formed in the limestone rock, covered with a stony arch which transmits a fine stream of water. The subterraneous river enters the aperture of an extensive cave about 40 yards wide, in the bottom of which, a strong whirlpool sucks in the floating pieces of timber, and carries them out of sight. In the year 1779, the valley contained about 60 or 70 families, who had formed several valuable plantations. (Q)

BALDIVIA. See Valdivia.

BALDNESS, a disease, or the effect of old age, by which the hair falls from the crown of the head and the parts immediately above the temples. Women and eunuchs are seldom afflicted with this disease, which, in young persons, often arises from excessive venery. See Buffon's *Nat. Hist.* by Smellie, vol. ii. p. 442. (*j*)

BALDOCK, a neat town of England, in Hertfordshire, built by the knights templars in the reign of Stephen, and standing on a chalky soil between two hills. There is a strange charity in this parish, which is deserving of notice. John Parker, Esq. left £10 a year to purchase 26 penny loaves, to be distributed every Sunday after they had lain on his grave during the time that the bell tolls for the morning service. There are four ancient encampments on the hills in the neighbourhood. The town carries on a considerable trade in malt. Population in 1801, 1283, of whom 202 were employed in trade and manufactures. See Salmon's *History of Hertfordshire*. (*w*)

BALDWIN, I. and II. emperors of Constantinople, in the 12th and 13th centuries. See Gibbon's *Hist.* chap. 60, 61, vol. xi. p. 169, 232. (*w*)

BALEARES Insulæ, the ancient name of the islands of *Majorca* and *Minorca*, off the coast of Spain, opposite the mouth of the Ebro. Of the name of these islands various etymologies have been given; all of them referring, however, to the dexterity in

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iol.

slinging, for which the inhabitants were particularly celebrated. According to Bochart, the Baleares were peopled by a colony of Phœnicians; and their name is compounded of the two words בעל ירה, *bal-iareh*, signifying *skilful in throwing*. M. Gebelin suggests, that, as *Baal*, the oriental name of the sun, came to be generally applied to all elevated objects, *Baleares* was the proper appellation of those who were famous for throwing stones from slings to a great height. The more received and proper etymology, however, refers the name of these islands to the Greek word *βαλλειν*, *to throw*. If we may believe the accounts given by ancient historians of the manner in which the Baleares were educated, they could not fail to become the most expert slingers in the world. While yet infants, their breakfast was every morning suspended by their mothers on a tree, nor were they allowed to taste it, till they had struck it down with a stone from a sling. Their dexterity was seconded by great bodily strength, insomuch that the best tempered arms were often shivered by the stones which they discharged. They carried to battle three slings of different lengths, which they used according to their different distances from the enemy.

The Baleares lived for ages in a state of savage simplicity. The skins of sheep, or other animals, served to shelter them from the cold; and caves in the rocks, or holes burrowed out in the ground, were all their abodes. Their fertile soil supplied them with the necessaries of life; nor had they even an idea of its luxuries, till they were corrupted by their connection with the armies of Carthage. Their manners became then so dissolute, and their propensity so lascivious, that, to allure them into foreign armies, no other temptation was necessary than women and wine. Peaceful in their disposition, they lived unmolested by other nations, till some of them having leagued with the pirates who infested the seas, drew upon their country the vengeance of the Romans. About the 630th year of the city, Metellus, the consul, was sent to invade them. He overran their territories without difficulty, and, to secure his conquest, planted two colonies, named Palma and Pollentia, at the east and west extremities of the large island. For his success in this expedition, he was honoured with a triumph, and distinguished by the surname of *Balearicus*. The two islands, of which the larger (now Majorca) was called *Balearis Major*, and the smaller (Minorca) *Balearis Minor*, were about thirty miles distant from each other. They formed a part of the *Provincia Tarragonensis*; and, on account of their excellent harbours, and their commodious situation for navigators in that part of the Mediterranean, obtained the appellation of *Fortunatæ*. See Campbell's *History of the Balearic Islands*. Grasset St Sauveur, *Voyages aux Iles Baleares*. (μ)

BALE. See Basle.

BALI. See Balli.

BALIOL, John, king of Scotland, is remarkable only from his being the successful competitor for the throne of that kingdom, and from his having brought his country to the lowest degree of humiliation. On the death of the Maid of Norway, the nation was distracted by the claims of various competitors for the crown. Bruce and Baliol stood foremost on the list; and, to prevent the civil discord and bloodshed, which must of necessity have ensued from a protracted dispute, they agreed to refer their claims to the arbitration of the king of England. Edward, disappointed in his design upon Scotland, by the premature death of the Maid of Norway, who had been betrothed to his son Edward prince of Wales, had determined, at every hazard, to gain an ascendancy in that kingdom. A favourable opportunity now offered itself; and his ambition was equalled by his injustice. He summoned the competitors to meet him at Norham, where he had assembled his parliament, and where he proposed to determine their respective rights. But what was the astonishment of the Scottish chiefs, when, instead of deciding their claims with the disinterested integrity of an umpire, he demanded, as a preliminary, that they should acknowledge him as the superior and liege lord of the kingdom. To procure proof, that this superiority had always belonged to the kings of England, he had ransacked the musty chronicles of every abbey in his dominions; and all he could produce consisted of mere fiction and unsupported allegation. But to supply the place of argument, he had assembled a numerous army on the borders, and seemed determined to support the weakness of his proof, by the strength of his power. The love of dominion, and the fear of weakening their cause by offending their umpire, seems to have quenched every spark of patriotism in the breasts of the competitors. None were found daring enough to resist such usurpation; and to the dishonour of our country it is recorded, that they all to a man signed a recognition of Edward's paramount power in Scotland —acknowledging the subjection, and sacrificing the independence of their country. Baliol was chosen by Edward, as the fittest person for assisting him in the prosecution of his ambitious designs. He was crowned at Scone, in 1292, and immediately recognized by the nobility. He then returned to Newcastle, to profess himself a vassal of England, and to do homage for his kingdom. But this was the least part of his humiliation. Edward soon discovered the extent of his ambition. Instead of being contented with the homage of the sovereign, he began to interfere with the internal regulations of the kingdom; and even cited Baliol, upon several trivial occasions, to appear at the bar of an English parliament, to answer as a private delinquent. The king of Scotland bore tamely for a while these grievous indignities; but a train of injuries and insults roused to resistance even the meek spirit of Baliol, who now seemed determined to wash out, by his future conduct, the ignominy of his former meanness and degradation, and to atone to his country for the injustice which he had done her. He openly renounced his allegiance to the king of England, and entered into a treaty with France to make common cause against Edward. But the resolution of the timid Baliol soon vanished in the midst of dangers. An invasion of his dominions compelled him to implore the clemency of Edward, who demanded from him the most abject and mortifying submission. Stripped of his regal ornaments, and mounted on a sorry horse, with a white rod in his hand, he was carried before his conqueror, to whom he acknowledged his deep penitence for the disloyalty of his conduct, and made

Baliol.

a solemn and irrevocable resignation of his crown into the hands of Edward. Baliol was sent in chains to remain a prisoner in the Tower of London; but being soon after allowed to retire to France, he resided there, as a private gentleman, on his own estates. During his absence, a band of patriots arose to assert the independence of their country; and though they admitted the name of Baliol into their public acts and manifestoes, they proceeded as if no such person had existed. Some attempts were afterwards made to restore him to his throne, but in vain. He died in 1314, in the 55th year of his age.

In the character of Baliol there is little either to praise or to blame. His conduct was the effect of a weak rather than of a wicked mind; and he yielded to the circumstances of the times, and to the example of others, rather than to his own ideas of rectitude and honour. He was ashamed of the part he had acted; and his short and unavailing struggle to extricate his country from the power of Edward, entitles him to our commendation and pity. When stripped of his kingdom, he regretted not the power which he had lost, but was contented to live in privacy and retirement in a foreign land. It has been asserted, much to his disadvantage, but upon what authority we know not, that Bruce, his competitor, was offered the crown upon the same terms, and that he generously refused to hold it as depending upon England. From the most authentic records we can affirm, that Bruce was the first who acknowledged the superiority of Edward; that he preferred a petition to him as liege lord of Scotland; and that his son and party were afterwards found under the banners of England, fighting against their country. In contrasting the characters of Bruce and Baliol, with regard to patriotism and integrity of conduct, our preference, however contrary to vulgar opinion, must rest with the latter. See *Biog. Brit.* Dalrymple's *Annals*. Robertson's *Hist. of Scotland*, vol. i. p. 10. Guthrie's *Hist. of Scotland*, vol. ii. p. 43—94. Hume's *Hist. of England*, vol. ii. p. 252. (*p*)

BALISTA. See ARMS and ARTILLERY.

BALISTES, in Zoology, a genus of cartilaginous fishes, belonging to the order *Branchiostigi* of the Linnæan system. See ICHTHYOLOGY. (*f*)

BALK, probably the ancient *Bactria*, is a large town of independent Tartary, situated on the river Dehash, which flows into the Amu. It is the capital of the province of Balk, which includes the whole of Great Bucharia, to the south of the Amu. In the beginning of the last century it belonged to the khans of the Usbecks, and was then the largest and the most populous of their cities. The greater part of the buildings are of brick and stone; the fortifications are mounds of earth, supported on the outside with a strong wall; and the castle or palace of the khan is built entirely of marble from the surrounding mountains. In the year 1221, when Zengis Khan plundered this city, and massacred its inhabitants, it is said to have contained 1200 temples, and 200 public baths for foreign merchants and strangers. The inhabitants of Balk were regarded as the most civilized and the most industrious of all the Mahometan Tartars. It is now the chief seat of the trade between Bucharia and Hindostan; and the most beautiful stuffs are made in the town, from the silk collected in the neighbou The fine river of Dehash contributes much commercial greatness of Balk. The duty upo chandise is only 2 per cent.; and those goods pass through the country, pay no duty. See D belot, *Bibliotheque Orient.* p. 167. (*o*)

BALKASH, PALCATI, or TENGIS, a lar in Tartary, belonging to the Kalmucks sub China. It is 140 miles long and 70 broad, an largest in Asia, excepting Aral and Baikal.

BALLANDEN, JOHN. See BELLENDE

BALLANDEN, WILLIAM. See BELL

BALLAST. See SEAMANSHIP.

BALLI, or BALI, or LITTLE JAVA, one Sunda isles, situated at the eastern extremity It is about 75 miles long, and 45 wide; and a great number of the inhabitants are sold fo it contains a population of about 600,000. quantity of cotton is produced in the island, along with what is brought from Sumbawa, neighbouring cities, is made by the inhabita different kinds of stuffs.

Rice is produced here in great quantities; king does not permit any part of it to be so surplus rice above what is consumed, is carri ally into the fortresses on the summits of th tains, for years of war and scarcity. The is duces great quantities of cocoa nuts, oranges, trons, with which the woods and uncultivated are filled. The shores of Balli are cover fish. The only trade which is carried on is i and cotton stuffs, which they transport in the boats to the coast of Java.

Mines of gold and copper are said to exis island; but the king does not allow them to b ed. Balli is an excellent place of refreshm vessels that go to the Moluccas, to Banda, Macassor; and the Chinese sometimes visit exchange their silver and their porcelains for ton stuffs of the country. E. Long. 115° 20′, 8° 40′. See Peuchet's *Dict. Geograph.* Co and Forest's *Voyage to Papua*, p. 170. (*q*)

BALLIBAY, a market town of Ireland, county of Monaghan, remarkable for its li ket, and for the extensive bleachfields and Crieve, where 50,000 webs are bleached a See Coote's *Statist. Account of Monaghan*.

BALLINA, a town of Ireland, in the co Moy, beautifully situated on the river Moy. a linen market, it has one of the most cons salmon fisheries in the island, which produces a about 80 tons of salted fish, beside those which fresh. See Beaufort's *Memoir*, and Young's *To*

BALLINAHINCH, the name of a bar the county of Galway, in Ireland. See Bea *Memoir*, Young's *Tour*, and GALWAY. (*j*)

BALLINASLOE, a thriving and well town in the county of Galway in Ireland, r able for its great wool fair on the 13th of Jul for several cattle fairs, at which no less than oxen and 100,000 sheep are sold annually. Beaufort's *Memoir* and Young's *Tour*. (*j*)

BALLINTOY, a small sea-port town of I in the county of Antrim, with a tolerably goo bour. At a little distance from Ballintoy, the for its apparent decrease. He supposes, that instead of really subsiding, it may only be slightly shifting its position, and gaining in one quarter as much as it loses in another. This effect he ascribes to the large rivers, which flowing into this sea with great rapidity, carry along with them vast quantities of earth and sand, by which the beds at their mouths are raised, and their banks extended towards the sea. The waves of the Baltic do not swell so high as in the ocean, but they are more dangerous and harassing to the shipping, as they succeed each other with greater rapidity and impetuosity. Amber is deposited in its agitations on the shores of Courland and Prussia; and it appears, that all the knowledge which the Romans possessed of the maritime powers of the Baltic, was obtained by their merchants, who journeyed by land in search of amber. Its water does not contain above one-thirtieth part of salt, whereas the water of other seas often holds one-tenth. This freshness may proceed in part from the number of large rivers which discharge themselves into this sea; but it seems to be chiefly owing to the large quantities of ice formed in its northern gulfs. It has a very perceptible current; and when the wind blows strong from the north, the water becomes so fresh as to be even fit for drinking or preparing meat. Even in the hottest summers the Baltic is cooler than any other sea. Though it has no regular tides, being almost entirely surrounded by land, yet when a strong west wind prevails for any considerable time, its natural outlet is prevented, and a large accession of water is forced into it from the North Sea; on such occasions, it rises on its coasts a little above its ordinary level. The ebbing and flowing of the German Ocean, though very weak, is said to co-operate with the Baltic, so that traces of their effects may be perceived.

Not fewer than forty streams flow into the Baltic, on this side of the Frozen Ocean, of which the principal are the Düna, the Oder, the Vistula, the Rega, the Persante, and the Niemen. The principal islands in this sea are, Zealand, Rugen, Bornholm, Oland, Gothland, Dago, Œsel, Cronstadt, Hochland, Tytersaari, Savansaari, Penisaari, Seitsaari, Mohn, Falster, and Aland. Heavy gales of wind are frequent in the Baltic, particularly in the gulf of Finland, and it abounds likewise with rocks and shelves, which render its navigation extremely hazardous.

The Baltic washes the coasts of Sweden, Russia, Denmark, Courland, Prussia, and Germany; and the productions of these countries form one of the most important branches of British commerce. The Russian ports in this sea, or more properly in the gulf of Finland, are Fredericksham and Wyburg, in the government of Wyburg; Petersburg, (or Cronstadt,) the imperial residence, and capital of the government of Petersburg; Narva, Revel, and Hapsal, in the government of Revel, to which Arensberg, in the island of Œsel, likewise belongs; Pernau, and Riga, in the government of Riga, and in the bay of the same name. During winter, the navigation to these ports is closed, and, as that season approaches, the weather becomes very tempestuous. Revel, Pernau, Arensburg, Hapsal, and Baltic Port, are shut up by the ice in November or December, and are generally open again in February or March. Riga is blocked up in October or November, and opens either in March or April. Narva, Cronstadt, Wyburg, and Fredericksham, shut in October or November, and open in April, though at Petersburgh the ice sometimes continues firm till May. The safest anchoring places are Rogervick Bay, or Baltic Port, Revel Bay, Kasperwich under Hogland island, Aspo, and Sceskar. The coast is rocky and dangerous. All the ports, except Revel, are inconvenient and unsafe for loading and landing goods. By the annexation of Courland to the Imperial dominions, Russia gained the ports of Windau and Liebau. Some idea of the Russian trade in the Baltic may be acquired from the following statements of the number of vessels which came to or left its ports, and of the amount of exports and imports in the years 1797 and 1802. In 1797, the number of ships arrived was 2541, of those that sailed 2472,—the amount of imports was £25,592,829,—of exports, £46,940,443. In 1802, there arrived 2768 vessels, and sailed 2632,—the imports amounted to £32,983,418, and the exports to £46,917,134. The customs of the year 1797 amounted to £4,790,807;—of those in 1802 we have seen no statement. The proportion of British vessels which arrived in these ports in the last mentioned year was 308 laden, and 515 unladen,—there sailed 758 laden, and 39 without cargoes.

Prussia possesses a territory of nearly four hundred miles on the shore of the Baltic, which, in that extent, receives some of the finest navigable rivers in Europe. There are likewise some branches of the Baltic Sea which indent the Prussian coasts, and ar called lakes, or haffs. Of these the largest is th Courish Haff, which runs directly south-west fro Memel, spreading to a considerable breadth, a penetrating within sixty miles of Konigsburg. T Frische Haff forms a long lake between Konigsbu and Elbeng, and communicates with the sea at lau. It is also connected with Dantzic by branches of the Vistula. There is also another haf Pomerania, formed by the islands of Usedom Wollin, and communicating with the Baltic, by th channels, the principal of which is Swinemun The principal Prussian ports on the Baltic are M mel, Pillau, and Dantzic. With these ports Brit carries on a considerable trade. Timber is the ch article of exportation from Memel; corn and tim are the staple articles of the Dantzic trade.

Mecklenburgh, a duchy in the circle of Lo Saxony, lying betwixt the Baltic and the Elbe, only two ports on the Baltic, Rostoc and Wisma

Sweden extends along the whole western coast the Baltic, on both sides of the gulf of Bothnia, a along part of the northern coast of the Gulf of F land. It commands, of course, a considerable p portion of the Baltic trade. Its principal ports that sea, are Stockholm, Gottenburg, and Stralsun

Though but a small part of the Danish dominio lies upon the Baltic, yet that part is by far the mo interesting; and has acquired an importance fro the present state of commerce, which it never e joyed at any former period. The duchies of Ho stein and Sleswick, with Zealand, and some small islands, nearly shut up the communication betwe the Baltic Sea and the ocean; and all the trade Europe passes through that small country.

Copenhagen, the capital of Zealand, and of th for sardelles and anchovies. The potted lampreys taken at Narva are equally delicate. See Tooke's *View of the Russian Empire*, vol. iii. p. 168. (μ)

BALTIMORA, a genus of plants of the class Syngenesia, and order Polygamia Necessaria. See BOTANY. (w)

BALTIMORE, one of the eighteen counties of Maryland, in North America, is divided from Ann Arundel county by the river Patapsco, which bounds it on the south and south-west; and from Hartford county by the rivers Gunpowder, and Little Gunpowder, on the east and north-east: its other boundaries are Frederick county on the west and south-west, Pennsylvania on the north, and Chesapeak bay on the south-east. Between the rivers which bound this county, there are two others, called Back and Middle rivers; but they are, properly speaking, only arms of Chesapeak bay. About four or five miles east of the Patapsco, Back river receives two small streams, one of which is called Herring Run. Middle river has scarcely any supply of fresh water. This county abounds with iron ore, of a quality particularly adapted for casting; and the ore is found in banks so near the surface of the earth, that it is never necessary to sink a shaft in order to procure it. The population was estimated about fourteen years ago at 25,434 inhabitants, including 5877 slaves. Annapolis is reckoned its capital, though Baltimore is a far more considerable town. (μ)

BALTIMORE, the principal town in the above county, is the largest in the state of Maryland; and is ranked by Morse the fourth in size, and in commerce the fifth town in the United States. Within these few years, however, it has increased so rapidly, both in trade and population, that Weld, who visited that country in the years 1795-7, places it next after New York and Philadelphia; and Du Lac, whose observations were made about seven years ago, rates it one of the most important commercial ports within the extensive countries which the United States comprehend. It is situated on the north side of Patapsco river, at a small distance from its junction with the Chesapeak. The basin, around which the town is built, is reckoned one of the finest harbours in America; and its entrance, scarcely a pistol shot across, is defended by a fort which completely secures it against any naval force. Here the water rises, in ordinary tides, to the height of five or six feet. No situation can be more favourable for commerce than that of Baltimore. Upwards of 2000 merchant vessels can ride in perfect safety within its basin; and the bay, with which it communicates, penetrating two hundred and eighty miles up the country, and connected besides with many noble rivers, affords uncommon facilities for inland navigation. A creek divides Baltimore into two parts, one of them what is properly called the town, and the other Fell's Point. As the water in the harbour is only nine feet deep, and a particular wind is necessary to enable ships to get out, the greater number of those which trade to Baltimore stop at Fell's point, where vessels of six hundred tons burden can lie without danger. These advantages have induced many of the mercantile people to settle on this point, which is connected with the town by two bridges built over the creek. Houses extend irregularly between them; and upwards of seven hundred have already been built upon the point; and a plan for regular streets, and a large market-place, has been laid down, and partly executed. In the town itself, the principal street, named Market Street, runs nearly east and west, parallel with the water, and is at least a mile in length, and about eighty feet wide. Here, as in Philadelphia, most of the streets cross each other at right angles, and several of them, particularly Calvert, South, and Gay Streets, are handsome and well built. Some of the rest, however, are not paved, so that when heavy rains fall, the soil, which is a stiff yellow clay, retains the water long, and renders them almost impassable. Baltimore contains ten churches; and the various denominations of Christians are, Episcopalians, Presbyterians, German Lutherans, German Calvinists, Reformed Germans, Nicolites or New Quakers, Baptists, Roman Catholics, and Methodists. Each of these sects have one church, except the Methodists, who have two. The Presbyterian church is the finest building in the whole town. It is built of brick, with a large portico in front, supported by six pillars of stone. The court of justice, the custom-house, and the guild-hall, are also very fine edifices. Here, as at Philadelphia, there are an hospital and poor house, a prison, theatre, and a bank, which, when Du Lac visited the town, was unfinished.

The low situation of the town renders it rather unhealthy, though its rapid increase has given rise to improvements which have considerably meliorated the air. Here, as well as in New York and Philadelphia, the yellow fever has sometimes committed its ravages. The most sickly season is in autumn, when the wealthy inhabitants generally retire to their country seats, many of which are situated most delightfully in the neighbourhood of the town. To the north and east the land rises, and affords a most enchanting landscape. "The town," says Morse, "the point, the shipping both in the basin and at Fell's Point, the bay as far as the eye can reach, rising ground on the right and left of the harbour, a grove of trees on the declivity at the right, a stream of water breaking over th rocks at the foot of the hill on the left, all conspi to complete the beauty and grandeur of the prospect.

Baltimore is inhabited by people from all the v rious parts of Europe, of whom the Irish are t most numerous. Almost the whole inhabitants a engaged in trade, to which they very diligently a ply. Their character is very superior to that of t Americans in general; and their hospitality to str gers has drawn forth the warm eulogiums both Du Lac and Weld. We cannot deny ourselves t pleasure of quoting a compliment paid by the form of these travellers to our countrymen who have settl in Baltimore. "The principal commercial houses Baltimore," says he, "are Scotch. This active, e terprising, economical, and industrious people, car with them the love of labour and the arts."

To obtain some idea of the increasing prosperity this place, we need only compare its present popul tion with the statements given of it at various perio within the last eighteen years. In Morse's Amer can Geography, published about the year 1790, h states the number of inhabitants to be between

BAMBOO Habit, a contrivance among the Chinese for keeping themselves afloat in water, by a number of cross bamboos. (*j*)

BAMBOUK, or Bambuck, a kingdom of Western Africa, situated between the rivers Bafing and Faleme. The soil of this state is dry and unproductive, the temperature extremely high, and the climate unwholesome. Gold is so plentiful, that it is obtained by merely scraping the surface of the earth, which is clayish and sandy. When the mine is rich, it is wrought only to the depth of a few feet. In separating the gold from the earth, the larger pieces only are obtained, as the lesser pieces are washed away with the water which runs down an inclined plane. According to the Abbe Demanet, there are also mines of silver, lead, and tin. The iron, which they melt and convert into instruments of husbandry and war, is of a very excellent quality, and saltpetre is found in great quantities.

The inhabitants of Bambouk have woolly hair and a sable complexion. They are distinguished into two sects, viz. Mahometans and Deists, but they live in harmony and mutual toleration. Their food is rice, beef, and mutton, and their wine is a liquor prepared from fermented honey. The method by which they weave their cotton cloths, is very laborious and difficult. The kingdom is traversed by the mountains of Konkodoo, which abound with gold. Bambouk, the capital, is situated on a stream which runs into the river Faleme. See Raynal's *Hist. of the East and West Indies*, vol. iv. p. 138; and Rennel's *Proceedings of the African Association*, 1778. (w)

BAMBUSA, a genus of plants of the class Hexandria, and order Monogynia. See Botany. (w)

BAMFF. See Banff.

BAMIYAN, or Bamian, a city placed in the centre of Paripamisus, a branch of Mount Caucasus, in that part of independent Tartary called Great Bucharia. In Sanscrit it is called *Vámí-nagari, Vami-grám*, and in a derivative form *Vámíyan*, "the most beautiful and excellent city." It is a place of great antiquity, and at a very early period was regarded as the metropolis of the sect of Buddha. It was therefore emphatically styled *Buddha-Bámíyan;* but this venerable title has been perverted by the malicious Musulmans into *But-Bámíyan*, or *Bámian*, "of the evil spirit."

This celebrated city, the Thebes of the east, is represented in the books of the Bauddhits, as the source of purity and holiness. They pretend that it was built by the patriarch Shem, from whom it is sometimes called *Sham-Bámíyan*. This patriarch they suppose to have been an incarnation of Jina or Vishnu; an opinion which likewise prevails among the Bramins.

Bámíyan is situated between Bahlac and Cábul, from the latter of which it is distant eight *manzils* or day's journey. Like Thebes in Egypt, it is entirely cut out of an insulated mountain; and the surrounding valley is called, in the language of the country, the Tágávi, or district of Bámíyan. About two miles south from this place are the ruins of an ancient city called *Gulghuleh*, which, at a remote period, was desolated by the furious zeal of the Musulmans. The ruins of some buildings of masonry are still seen round a small conical hill in the neighbourhood, whose su mit is crowned with the ruined palace of its ancie kings. Through the ruins of Gulghuleh, and t district of Bámíyan, flows a pleasant though sca stream, which rises in the adjacent hills, and falls in a lake, from which issue four rivers, the Hirmen the Landhi Sindh, the rivers of Bahlac, and of Cond

The city of Bámíyan consists of a great number apartments and recesses cut out of the rock; a from the *Ayeen Akberry*, as well as from the conc ring reports of travellers, we learn, that there are abo 12,000 of these recesses in the Tágávi of Bámíy Some of these appear, from their extraordinary mensions, to have been designed for temples. No of them have pillars, but some are adorned with nich and carved work; and fragments still remain figures in relievo, which have been miserably mu lated and defaced by the Musulmans. The walls, t have been decorated with paintings, the colour which gleam, here and there, through the sm with which they have been in general obscured the fires of the inhabitants. These recesses are cal by the natives *Samach'h*, and by the Persians *Sam* They are very frequent in the country of the Af ans; some of them extremely rude, but others hig finished and beautifully decorated. The most p fect are at Mohi, on the road between Bámíyan a Bahlac, in which the paintings retain their origi freshness, as their situation amongst precipices prevented the Musulmans from making them th habitations.

But no curiosities in Bámíyan or its vicinity more calculated to attract attention, than two col sal statues, seen at a great distance, which are least fifty cubits high. They adhere to the mo tain out of which they are cut; and stand erect i sort of niches, the depth of which is equal to thickness of the statue. At a small distance fr these stands another statue of less colossal size, bu only about fifteen cubits high. Concerning names or sex of these statues, oriental writers are agreed. The few Hindus resident in these coun say, that they represent Bhim and his consort: w the followers of Buddha maintain, that they are statues of Shahama, and his disciple Salsala. Musulmans, on their part, contend, that they are effigies of Key-Umursh and his consort, that is say, Adam and Eve; and that the third repres Selish or Seth, their son, whose tomb, or at least place where it stood, is shewn near Bahlac. As Musulman troops never pass that way without fi a few shots of cannon at them, one of the legs of male figure is much broken. It is said that Aur zebe, passing that way in his expedition to Ba in the year 1646, ordered a few shots to be fire usual. One of them took effect, and almost br the leg of the statue, which bled profusely. S frightful dreams conspired with this prodigy, to m him desist from the sacrilegious attack, and the c ted blood, we are told, adheres to the wound to day. This miracle is equally credited by Hindus Musulmans; the former ascribing it to the interp tion of the Supreme Being, and the latter imput it to witchcraft. Between the legs of the larg figure there is a door leading into a most spac temple, at the entrance of which are stationed a few wretched Banians, who sell provisions to travellers.

Bámíyan and Bahlac are constantly confounded by Persian authors, who call the first Balk-Bámíyan, and the second Bálk-Bohhárá. These authors suppose it to have existed before the flood; but the Budd-haists maintain that it was founded by a most religious man named Shama, (the same with the patriarch Shem,) and that his posterity lived there for many generations. They add, that Bálk-Bámíyan was originally Abraham's place of abode; that patriarch, according to scripture, and the sacred books of the Hindus, having removed with his father to distant countries in the west. Diodorus Siculus informs us, that it existed before the time of Ninus; but he, like the Persian writers, has mistaken this city for Bahlac. By the natives, Bámíyan and the adjacent countries are regarded as the abode of the progenitors of the human race. Here, too, the first heroes of Persian story lived and performed innumerable exploits; here their holy instructors first delivered their precepts; and here was the scite of the first temples that were ever reared.

Bámíyan fell into the hands of the Musulmans at a very early period of their history. At one time it was governed by kings; but this dynasty, after continuing but a few years, terminated in 1215. Gul-ghuleh, the royal residence, called then the palace of Bamian, was destroyed by Zengis Khan, whose resentment against the inhabitants was so violent, that he massacred them without distinction of age or sex, and even vented his fury against the brutes and trees. The natives of that country gave it then the name of Gulghuleh, signifying, "cries of woe." As it would have been ominous to rebuild it, they erected in its stead a fort, on a hill to the north of Bamians, which still bears the name of Imperial Fort. This castle also was destroyed by Zingis the Ushak, in 1628, and has never since been rebuilt.

The district of Bámíyan is now barren, and without a single tree; yet the sacred books of the Hindus, and of the Bauddhists, positively affirm, that of old it was fertile. There is a tradition, too, that at one period it was so overstocked with inhabitants, that trees, underwood, grass, and plants, were all completely destroyed. The vegetable soil, thus deprived of cultivation, was, in the course of ages, washed away by the rains; and indeed the soil in the valley is extremely rich, and the whole district, as it now is, a most delightful spot. The vine, and almost all the fruit trees we have in Europe, grow spontaneously and to high perfection in the country to the eastward of Bámíyan, as far as the river Indus. The natives, when they find a vine or any fruit tree in the forests, clear away all the wood about it, and dig the ground, which brings the fruit to perfect maturity. Bámíyan seems to be the Drastoca of Ptolemy, that name being derived from the Sanscrit Drashatca, which signifies the "stone city:" for before that time towns were nothing more than a mere assemblage of huts. The distance and bearing of Drastoca from Cabura, or Orthospana, leaves no doubt that it was the same city as Bámíyan. For the whole of our information concerning this city, we are indebted to Captain Francis Milford's ingenious *Observations on Mount Caucasus*, in the 6th volume of the *Asiatic Researches*, p. 462, &c. (μ)

BAMPTON, a market town in Devonshire, is situated on a branch of the river Exe, and surrounded with lime-stone hills. The principal manufacture of the place is serges. Population 1364. See Plot's *Natural History of Oxfordshire*; and Polywhele's *History of Devonshire*, vol. ii. (*j*)

BANANA. See Pine Apple.

BANARA, a genus of plants of the class Dodecandria, and order Monogynia. See Botany. (*w*)

BANBURY, a town of England, in the county of Oxford, situated on the river Charwell. From the number of Roman coins, &c. found in the adjacent fields, it is supposed to be the scite of the Roman station Branavis. The canal from Oxford to Coventry passes through Banbury. There is here a manufactory of plush and shag cloths; and two springs, one sulphuretted, and the other chalybeate. Population 2755, of whom 567 are employed in trade and manufactures. See Bray's *Tour in Derbyshire*. (*j*)

BANCA, one of the Asiatic islands, situated between Sumatra and Borneo, and separated from the former by the straits of Banca. The king of Banca, who resides in the territory of Palambang, in the isle of Sumatra, is in alliance with the Dutch, who have a settlement and troops at Palambang. The Dutch assist him in maintaining his independence, and are amply repaid by the monopoly of the tin, for which the island of Banca is so celebrated. The tin mines, which appear to be inexhaustible, were discovered in 1710. The managers of the mines, who happen to be Chinese, deliver the tin to the king for 5 rix dollars per 125 pounds; and the Dutch obtain the same quantity for 15 rix dollars, which is nearly £2, 18s. per English cwt. The quantity received by the Dutch, amounts to about three million of pounds annually, the greater part of which goes to China. In 1778, 700,000 pounds were sent to Holland. East Long. 106° 30′, South Lat. 2° 30′. See Wilcocke's edition of Stavorinus's *Voyage to the East Indies*, vol. i. p. 357. Staunton's *Embassy to China*, vol. i. p. 305; and Marchand's *Voyages*, vol. i. p. 98. (*o*)

BANCALIS, a town in the kingdom of Acheen, in the island of Sumatra. See Peuchet's *Dict. de la Geograph. Commerç.*; and Acheen. (*w*)

BANCHUS, in Zoology, a genus of hymenopterous insects in the system of Cuvier and Dumeril, belonging to the family of *insectirodes*, and nearly allied to the *ichneumons*. See Entomology. (*f*)

BANDA Isles, the name of a group of Asiatic islands, called the Spice or Nutmeg islands, lying to the south of the island of Ceram, and to the south-west of Papua, or New Guinea. The islands comprehended under this general name are, Banda or Lantor, Neira or Nera, Puloway, or Way, or Ay, Pulorohn or Rohn, Rossingen or Rossagay, Gonong or Guenanape, or Ganapez, Pulo-pisang, Pulo-prampon, Pulo-suanjee Capal, and Nylacky.

In the year 1602, the Dutch landed in the Banda isles, which formed one of their earliest settlements in the Indies. In 1609, they entered into a treaty with the Orancais or natives, who bound themselves to send all their nutmeg and mace to the Dutch fort of Nassau, in the island of Nera, at a fixed price, while the Dutch pledged themselves to defend the natives, particularly against the Portuguese. The breach of this agreement by the natives, and the murder of the Dutch commissary, occasioned hostilities between the two powers. In 1616, a similar treaty was entered into with the English, who were then at war with the Dutch; but this also was broken by the inhabitants of Banda. The English having refused, after they had made peace with the Dutch, to join them in the reduction of the Banda isles, the latter attacked them in 1621, and compelled the natives to deliver up their towns, their forts, their arms, and all their islands. In order to secure to themselves the nutmeg and mace which these islands produced, the Dutch erected forts in all the islands, and divided the soil into orchards, which they distributed among the Dutch colonists in proportion to the number of their slaves. The Banda isles were taken from the Dutch by the English admiral Rainier in 1796, and in 1801 were restored to them by the treaty of Amiens.

The chief settlement of the Dutch is in the island of Nera, which has an excellent harbour, commanded by the cannon of the forts Belgica and Nassau. The island of Banda, which is about 8 miles long and 5 broad, is defended by a fort and two or three redoubts. It contains 25 nutmeg fields, which produce annually about 570,000 pounds of nutmegs, and 140,000 pounds of mace, called the flour of nutmeg. The hurricane of 1778, however, nearly annihilated the nutmeg trees of this island. These nutmeg fields occupy about 70,000 square toises. In the island of Puloway there is a small fort; Pulorohn is defended by a small redoubt; Rossingen has also a redoubt; and Gonong is remarkable for a volcano, which always sends forth smoke, and sometimes flames. The nutmeg flourishes amidst the lava of Gonong, as well as in the fine black mould which covers the other islands.

In the year 1796, the annual produce of the Banda islands was 163,000 pounds of nutmeg, and 46,000 pounds of mace. Between the years 1796 and 1798, the English East India Company imported 817,312 pounds of cloves, 93,732 pounds of nutmegs, and 46,730 pounds of mace, and about a third part more in private trade. In the year 1737, the Dutch East India Company sold at one time 280,964 pounds of nutmeg. In 1756, 241,427 pounds were sold; and in 1778, 264,189 pounds. The average has been considered to be about 250,000 pounds annually, which was sold in Europe at 75 livres per pound, exclusive of 100,000 pounds sold in the Indies. The average quantity of mace has been 90,000 pounds annually, and 10,000 pounds in the East Indies.

While the Banda isles supply Europe with their spiceries, they deny the means of subsistence to their own inhabitants. Sago, which is the pith of a tree of moderate size, serves them for bread; and the juice which exudes from its branches is their ordinary beverage. The cattle and grain which they use are imported from the island of Java. The population of these islands, which is said to have been once 15,000, is now only 5763. E. Long. 130° 40′, S. Lat. 4° 18′. See Stavorinus's *Voyage* by Wilcocke, vol. i. p. 331, vol. ii. p. 418. Bougainville *Voyage Autour du Monde*. Raynal's *Hist. of the Indies*. *Asiatic Register*, 1800, p. 200; and Peuchet's *Dict. de la Geog. Commerç.* (Q)

BANDAGE. See Surgery.

BANDANA **Handkerchiefs**, a species of the East Indian manufacture much admired in Europe, and fabricated in India both from silk and cotton. The ground of these handkerchiefs is commonly of a dark colour, most frequently red, blue, or purple; and the pattern almost always consists of spots generally white, or sometimes a bright yellow. The durability of the colours, and the darkness of the ground, have contributed to cause a very great demand for this article in the European market; and, from this cause, the home manufacturers have been long very anxious to produce articles of this description, which might rival the Indian goods in quality and cheapness.

The only mode of accomplishing this, was for a long time, and until very recently, considered to be by the ordinary process of calico printing with blocks upon white cloths; but in this way it was very rarely, if ever, in the power of the manufacturer to render his colours sufficiently durable, especially the reds; and therefore the home made article was never held in estimation by purchasers, most of whom consisted of that class of people to whom durability was a most essential, and even indispensible, requisite. Besides the difficulty of fixing the colour sufficiently, the tax upon this, as well as every other species of printed cloths, must have operated considerably in the comparison with the imported goods. Lately, however, a discovery has been made of a mode of manufacturing this kind of handkerchief, so as to ensure the durability of the colour, and at the same time to be entirely free from any tax whatever under the existin revenue laws. This manufacture was first practi at Glasgow, where it is now prosecuted to v considerable extent; and it is still, we have reaso believe, entirely confined to that part of the coun

The new process is exactly the converse of pr ing; for it consists of dyeing the cloth of a dur colour, as red, blue, or purple, and then discharg that part which forms the pattern, by means strong solution of the oxy-muriate of lime applied a mechanical process, which we shall now descr referring the reader for a plan and section of the paratus used, to Plate LII. Figs. 3. and 4.

The goods used for this manufacture are of cott sometimes woven plain, but much more freque tweeled. The cloth after being woven, is dyed, the colour most frequently used is the Turkey After the cloth has been dyed, it is smoothly and gularly folded in pieces generally containing tw handkerchiefs each, and in this state is put into press; which being firmly shut, to prevent the charging liquor from coming into contact with, operating upon, any part of the cloth, except that from which the colour is to be extracted, about ten or twelve minutes the chemical discharge completed. As soon as this is done, the press bei opened, another piece is put in, and the operation peated; so that, allowing 15 minutes for each pie about 50 may be put through the press in the cou of a day of 12 working hours, by the labour of

Banians.

ablution. They wear at their necks a stone about the size of an egg, which is perforated in the middle, and has three strings drawn through it. As this stone, which they call *tamberan*, represents their great god, it procures them very high respect among all the Indians.

The name *Banians* is likewise applied in general to all the idolaters of India, as distinguished from the Mahometans, and is more particularly appropriated to one of the four principal casts into which the Indians are divided: the other three casts are the Bramins, or priests; the Rajaputs, or men of the sword; and the artists, or labourers.

In their shaster, or statute-book, the proper Banians are distinguished by the name of *Shuddery*, which comprehends all persons engaged in traffic or merchandise. Their name, in the Bramin language, signifies innocent and harmless; and nothing can be more expressive of their real character; for they would not hurt the most insignificant creature, and they bear injuries with more than Christian meekness. They are not distinguished from the other Hindus by any peculiar religious tenets; but of the eight general precepts delivered by Bramaw, the Indian legislator, two are supposed more immediately to refer to the Banians, as they enjoin veracity and honour in all their speeches and transactions, and forbid circumvention in buying or selling.

A great proportion of the inland trade of the Indies is carried on by the Banians, particularly in the peninsula on this side of the Ganges. Though extremely expert in commercial transactions, they are equally remarkable for their honesty. Persons of this cast are generally chosen as the brokers of the English, Dutch, and French companies, with whose stock and cash they are almost constantly entrusted. The Banians are also bankers; and their bills of exchange are current almost through the whole of the East Indies. They have, besides, a kind of standing bank, in which persons may deposit their money, and lift it again when they find it convenient.

The form of contract which they employ in their bargains deserves to be described. The transaction is carried on in the most profound silence, by touching one another's fingers: the buyer takes off his girdle, and spreads it on his knee; and both parties, having their hands beneath it, can, by the mere intercourse of their fingers, mark, even to the lowest denomination, the price demanded, offered, and accepted. When the seller takes the buyer's whole hand, it denotes a thousand, and as many times as he squeezes it, so many thousand pagods, rupees, &c. are offered—every finger denotes a hundred; a half-finger, to the second joint, fifty; and the small end of the finger, to the first joint, ten.

Almost from childhood the Banians are accustomed to trade, and to that gentleness of disposition and of manners, which is characteristic of their cast. Their slaves are treated with great humanity. In general, they are extremely frugal; but, when they settle their children, they launch out into great extravagance. Their women are remarkable for their chastity; nor do husbands allow their wives the least intercourse with strangers. This restraint they justify by a favourite proverb: "If you bring butter too near the fire, you can hardly keep it from melting." (μ)

BANISTERIA, a genus of plants of the class Decandria, and order Trigynia. See BOTANY. (w)

BANK.

Bank.

IN commercial language, a bank is a repository or an establishment, for the purpose of receiving the money of individuals, either to keep it in security, or to improve it by trafficking in goods, bullion, or bills of exchange; and it may be either of a public, or of a private nature. A public bank is generally regulated by certain laws enacted by the government of the state, which constitute its charter, limit its capital, and establish the rules by which it is to conduct business. A private bank, on the other hand, is merely a contract among individuals, for carrying on a trade in money and bills; and the responsibility of the partners is the only security of those who transact with it.

Banks are properly commercial institutions, which, by affording credits, or issuing notes, as the representative of money, enable merchants, with greater facility, to buy and sell commodities at home or abroad. The produce of one country is thus exchanged with that of another, by means of a medium to which an ideal value is attached. Hence the great utility of banking establishments in all commercial countries.

Among the ancients, the term *banker* implied something different from its modern signification; and conveyed an idea corresponding with the profession of an agent, broker, or money-lender. Bankers were called *argentarii* and *nummularii*, by the Romans; and they lent out the money of private persons on interest, wrote the necessary deeds; and assisted in buying and selling all kinds of property.

The first establishment of banking in a regular and systematic form, took place at Venice, about the middle of the 12th century; and it arose from the necessities of the state. Duke Vitale Michel II. being involved in expensive wars with the empire of the West, and the Grecian Emperor Manuel, embarrassed the finances of the republic; and to relieve it from the pressure of its difficulties, he had recourse to a FORCED LOAN; the contributors to which were made creditors, and received interest at the rate of four per cent. per annum. "The Chamber of Loans" (*la Camera degl' imprestitii*) was established for the management of this fund, and regular payment of the interest; which, gradually improving its plan, at last formed itself into the more perfect institution of the Bank of Venice.

This celebrated bank has served as a model to almost every similar establishment in succeeding ages. Its capital is 5,000,000 ducats, for which the public is security. It is properly a board for deposit, credit, and interest. By an edict of the issued. The bank, however, gave credits and receipts also upon deposits of gold and silver bullion, at the rate of five per cent. less than the mint price of such bullion, which was restored again to the owner, if he called for it within six months, upon paying one-fourth per cent., if the deposit was in silver, or one-half per cent. if in gold. But if the term of six months was allowed to expire, the bank retained the bullion at the price stated in its books.

The advantage of making deposits in this bank is twofold. *First*, The credit enables the merchant to pay his bills of exchange. *Second*, The receipt gives him an opportunity of selling his bullion at an advance of price, if the market shall fluctuate in his favour. Although none can draw out bullion without producing a receipt, and re-assigning bank-money equal to the price at which the bullion had been received, yet it is not absolutely necessary that both credit and receipt should always remain in the hands of the same person; as he who has the receipt will find bank-money to buy at the ordinary market price, to enable him to relieve the bullion; and the owner of credit will, at all times, find receipts in abundance. But to prevent any extraordinary rise in the price of bank-money or receipts, which speculation, or other causes, might sometimes induce, the bank adopted the resolution of selling bank-money for the current coin, at an agio of five per cent; and if buying it, at the rate of four per cent.

It is generally understood, that the Bank of Amsterdam keeps in its repositories the full value in money or bullion of all the receipts it has issued; but it is not absolutely necessary to do so, as many of these receipts have expired. But that there is value in the bank equal to all the demands that can be made upon it, there is little doubt; for the city is guarantee that this should be the case, and the directors, who are annually changed, compare the treasure with the books, and would therefore detect any acts of fraud or imposition.

The four reigning burgomasters are invested with the direction of the bank; and the city of Amsterdam derives a considerable revenue from it, which arises from the following sources:—For all deposits, a fourth or half per cent. must be paid—from every person who opens an account, a fee of ten guilders is exacted; and for every additional account, three guilders three stivers—for every transfer, two stivers, or six stivers if the transfer is less than 300 guilders. If any person shall overdraw his account, he is fined three per cent. on the amount; and his order is set aside. There is also a considerable profit from the sale of foreign coin or bullion, which is always kept till it can be sold to advantage, and likewise, by selling bank-money at five per cent. agio, and purchasing it at four per cent. From these various resources, the Bank of Amsterdam became rich and prosperous; and it was supposed to retain in its repositories more gold and silver than any other establishment of the kind in Europe.

Bank of England, A. D. 1694.

Previous to the year 1694, there were only four considerable banks in Europe; but on the 27th July of that year, a charter was granted by William and Mary, for establishing the BANK OF ENGLAND, which, for opulence and extent of circulation, is no the greatest in the world. William Paterson, a n tive of Dumfries-shire, in Scotland, was the project of this bank, and, it is said, he took the Bank St George, in Genoa, for his model. Michael G frey, a gentleman of great consideration in the c of London, assisted Paterson to arrange the e blishment. The charter was granted for the t of twelve years; and the corporation was deter nable on a year's notice. A governor, depu ty governor, and twenty-four directors are annu lly elected from the proprietors, for managing the af-fairs of the company, but not above two-thirds of the directors of the preceding year can be chosen. A governor must be possessed of £4000 stock, and a director of £2000, before he is eligible; and it is requisite, that an elector should hold £500 stock to entitle him to vote at general courts.

The original capital subscribed by the proprietors was £1,200,000 sterling, which was lodged in the exchequer at the rate of 8 per cent. interest; and government allowed £4000 additional in name of house expenses, so that the bank received £100,000 annually. In 1697 the bank was allowed to ingraft £1,001,171 : 10 : 0 sterling on its capital stock. This enlargement was intended as a support to public credit, for tallies had been at from forty to sixty per cent. discount, and bank notes at twenty per cent. which was occasioned by the bank discontinuing to pay its notes during the great recoinage of the silver at that time going on. In terms of the act of the 7th Anne, cap. 7. the bank advanced £400,000 on the original annuity of £100,000, and there had been paid into the exchequer, in all, £1,600,000. In pursuance of the same act, the bank cancelled Exchequer bills to the amount of £1,775,027 : 17 : 10½ at 6 per cent. interest, and was allowed to double its capital. In 1708 the advances to government amounted to £3,375,027 : 17 : 10½, and the capital of the bank was now £4,402,343. By a call of 15 per cent. in 1709, there was paid in and made stock the sum of £656,204 : 1 : 9d; and by another of 10 per cent. in 1710, £501,448 : 12 : 11. In consequence of these two calls, the bank capital amounted to £5,559,995 : 14 : 8. By the 3d of George I. c. 8. the bank cancelled £2,000,000 of exchequer bills, which made the advance to government £5,375,027 17 : 10½. By the 8th of George I. c. 21. the bank purchased South Sea Company stock to the amount of £4,000,000. To enable the bank to effectuate this purchase, it increased the capital stock £3,400,00 by subscription, in the year 1722; and at this time the bank had advanced to the state £9,375,027 : 1 10½; but its capital stock was no more than £8,959,99 14 : 8. It appears, from this statement, that the ba advanced a larger sum to government than the who amount of its capital, on which it paid a dividend the proprietors. And this circumstance shews, t the bank possessed an undivided capital, which h accumulated from its establishment, which is the f and it has continued to have an undivided capital since. For in the year 1746 the bank had adva to the public, on different occasions, £11,686, and the capital on which it divided, had been r rate, or other persons united in partnership, above the number of six, can borrow money on their note payable sooner than six months, during the continuance of the charter of this company, who are declared to be a corporation, and to have the exclusive privilege of banking.

The character and security of the Bank of England are permanently established by the many provisions for its stability. But to ascertain the solidity of its bank-paper, or the reliance that the public may place in its engagements, it is only necessary to state, that value is received in security, or bills payable at a fixed time, for every note that is issued, so that there is always value in the bank equal to all the notes in circulation. This value consists of bullion or coin; government securities payable for receipts, or at determinate periods; and bills of exchange with three solvent names, at dates not exceeding two months.

Since the first establishment of the bank, it has not sustained any serious loss. So certain is the payment of bills drawn and indorsed, that, in ordinary times, the arithmetical calculation of the chance of loss is only as one to three hundred thousand: a proportion so insignificant, that no injury is to be apprehended from such a cause. Were a *run* to be made on the bank, and the owners of notes to insist on payment in specie, the discounting of bills would be discontinued, and consequently the whole notes in circulation would return to the bank in two months, in payment of the advances to government and the bills of individuals. The bank, therefore, has it always in its power to call in its notes, merely by refusing to accommodate government, or to discount bills of exchange.

But the mercantile people of England have well grounded reason to place confidence in the paper of the bank; and it must be highly gratifying to our national pride, to think, that bills of exchange can be obtained in any part of Europe for our bank notes, on the same terms as for specie.

The profits of the bank are supposed to be greatly accumulating; but as the directors are sworn to secrecy, it is only from circumstances, and the communications made by them to general courts, that we can conjecture as to that subject.

Bank of Scotland, A. D. 1695.

Within a year after the establishment of the Bank of England, a royal charter was granted for instituting the Bank of Scotland. The same William Paterson who projected the Bank of England, was also the projector of this bank. He seems to have been one of those enterprising men to whom the trade and prosperity of this country are so much indebted. The original capital of the bank was £1,200,000 Scots money, or £100,000 sterling; and its affairs are managed by a governor and deputy, with 12 ordinary and 12 extraordinary directors, annually elected by the proprietors of stock, to whose inspection the bank submits its accounts once a year. There are twenty branches belonging to the bank, in different towns in Scotland, under the management of agents, who in general receive fixed salaries for their trouble, and altogether the affairs of the bank are very prosperous.

In the year 1727, the Royal Bank of Scotland was erected by charter. It is managed by a governor and deputy, with eighteen ordinary and extraordinary directors; and its accounts are exhibited four times a year. The business of this bank is conducted on a plan similar to that of the Bank of Scotland; and the concern is also very profitable to the proprietors.

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In almost every town in Scotland, a bank has been established, and in some, two or three. But these banks are private copartneries, for the purpose of discounting bills of exchange, and selling drafts on London, Edinburgh, &c. for the accommodation of merchants and others. They also, in common with the chartered banks of Scotland, issue cash accounts or loans to individuals on bonds of security; and traffic in money and bills to a very great extent.

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The French nation, though less enterprising than the English, in every thing relative to commerce, have yet, in some respects, successfully imitated them. But in the particular instance of banking they have not been so fortunate, owing more to causes connected with their political institutions than to any want of knowledge, genius, or activity in the people.

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In the year 1716, a bank was erected in Paris by the celebrated John Law of Lauriston. The object of this bank, according to Mr Law's professions, was, "to increase the circulation of money, put a stop to the progress of usury, facilitate the exchange between Paris and the provinces, augment the circulation of manufactures, and enable the people to pay more easily the heavy taxes to which they were subjected." The letters patent establishing this bank, stipulated, that the stock should consist of 1200 *actions*, or shares of 1000 crowns of 5000 livres each, at the rate of forty livres the marc; so that each share was worth £250 sterling, and the whole stock of the bank £300,000 sterling.

The regulations for the government of this bank were wise and salutary. It was declared, that the bank securities belonging to, as well as the money lodged by, foreigners, should not be subject to confiscation, even in case of war with the nations to which the proprietors belonged; that all questions relative to the concerns of the bank should be determined by a plurality of votes; those possessing from five to ten shares to have one vote, from ten to fifteen two votes, and so on proportionally; that the accounts should be balanced twice a year, and two general courts held annually, at which the company's affairs should be discussed, and the dividends settled; that the bank should not undertake any sort of commerce whatever; that the notes should be payable at sight, and signed by the director and one proprietor; but under the revision of an inspector appointed by the government.

This bank, of which Mr Law and his brother William were the principal partners, assumed the firm of the general bank of *Law and Company*; and soon obtained the confidence of the public. As the notes they issued, bore on the face of them, that they should be paid in crowns of the weight and standard of the day on which they were granted, a securit was thus formed against the arbitrary practice varying the coin; and on this account, they we preferred by many to specie. The balance of change with Holland and England, rose in favour Paris, at the rate of 4 to 5 per cent.; and the af of the bank were so prosperous, that at a general meeting held the 20th December 1717, a dividend was ordered at 7½ per cent. for six months. There can be no doubt, but this bank would soon have rivalled that of Amsterdam, or of England, and produced consequences highly beneficial to France; but the arm of power interfered, and changed the institution from a private to a public concern. By act of council, bearing date the 4th December 1718, the public were informed, that his majesty had taken Mr Law's bank into his own hands, under the name of the *Royal Bank*, of which Mr Law was appointed director general, and branches were established at Lyons, Rochelle, Tours, Orleans, and Amiens.

The bank now proceeded on public credit, or, in other words, was entirely dependent on the will of the sovereign; and, as the schemes of monarchs are seldom limited by moderation or reason, it embraced objects so vast and extensive, that all Europe looked with anxiety for the issue. It was proposed to vest the whole privileges, effects, and possessions of foreign trading companies, the great farms, the mint, the general receipt of the king's revenues, and the management and property of the bank, in one great company, which having in their hands all the trade, taxes, and royal revenues of the kingdom, might multiply the notes of the bank to any extent they pleased. Accordingly, a commercial company was established by letters patent in August 1717, under the name of the *Company of the West*, to which was granted the whole province of Louisiania, through which the noble Mississippi flows; and from this circumstance the operations of the company obtained the name of the *Mississippi System*. Of this company 200,000 shares were issued at the rate of 500 livres each, bearing interest at the rate of 4 per cent. after the first year, exclusive of the profits of the trade.

On the 4th September 1718, the farm of tobacco was made over to the Company of the West, who engaged to pay 2,020,000 livres advanced rent to the king. On the 15th December following, they acquired the charter and effects of the Senegal company; but the most important grant they obtained was in May 1719, when an edict was published, transferring to them the exclusive privilege of trading to the East Indies, China, and the South Seas, together with all the possessions and effects of the China and India companies, on condition of paying the lawful debts of these companies now dissolved. On this occasion, the Company of the West assumed the title of the *Company of the Indies;* and 50,000 new shares were ordered to be constituted at the rate of 550 livres each, to be employed in satisfying the creditors of the old companies, in building vessels, and in other preparations for carrying on their trade. And from the vain expectation of possessing a lucrative branch of commerce, the price of a share rose to 1000 livres.

On the 25th July 1719, the mint was made over to the company, for a consideration of 50,000,000 livres to be paid to the king; and in order to raise that sum, 50,000 new shares, at the rate of 1000 livres each, were directed to be issued. On the 27th August following, the great farms were made over to the Company of the Indies, on their agreeing to pay 3,500,000 livres in advance of rent for them; and on the 31st of the same month, they obtained the general receipt of other branches of the king's revenue. The company now promised an annual dividend of 200 livres on each share, in consequence of which, the price rose in the market to 5000 livres each. The company engaging to lend the king to pay off his creditors 1500 millions of livres at 3 per cent. created in September and October 300,000 new shares, rated at 5000 livres each, so that they had now altogether 600,000 shares; but their annual income amounted to 131 millions, which arose as follows, viz. 48 millions interest from the king; 39 millions from the farms, the mint, and the receipt of taxes; and 44 millions from their trade. From so great a revenue they could well afford to pay more than 200 livres of annual dividend on each share. The infatuation, which at this time prevailed in France, raised the price of shares in the market to more than 10,000 livres each, and the original proprietors acquired immense fortunes. But the public had full confidence in the stability of the bank; money was abundant; the agriculture, manufactures, and commerce of the French flourished; plenty displayed itself in the capital, the cities, and provinces; and government were enabled to relieve the people from the burden of 87,000,000 of duties and taxes.

Notwithstanding the general confidence in the stability of the Bank and India company, yet there were individuals who held a different opinion; and they eagerly converted their paper into specie, which they either hoarded up or remitted abroad. This occasioned a constant drain of gold and silver; and specie became so scarce, that there was not a sufficiency left in France for the ordinary purposes of circulation. A run on the bank was now apprehended, and to avert the danger which threatened the whole system, several edicts were passed in January, February, and March 1720, restricting payments in specie to small sums; prohibiting the manufacture of plate without the royal licence; and declaring, that all rents, taxes, and customs, should be paid in notes, the value of which was to remain always invariable, while the standard of the coin was kept in constant fluctuation. But the plan of restriction was carried to its greatest height, by the edict of the 27th February 1720, which prohibited individuals, and secular or religious communities, from having in their possession more than 500 livres in specie, under pain of a heavy fine and confiscation of the sums found in their custody. These measures could not fail to have the effect, to throw an immense sum in specie into the coffers of the bank; and it is said, that betwixt the 27th February and the 1st April 1720, not less than 300 millions of livres were paid in coin into the bank.

The Royal Bank was now incorporated with the Company of the Indies, and the king remained guarrantee of the bank notes, of which none were to be fabricated in future, except in virtue of edicts of council. The profits which had been made by the bank since his majesty had taken it into his own hands, in December 1718, were given up to the company; and as they were supposed to be immense, the public entertained a high idea of the company's ope-lence. At this period, the public credit of France was at its height; but it soon experienced a reverse, that involved thousands in misery and distress.

Cardinal du Bois, and others of the ministry, who envied or detested Mr Law, represented to the regent that it was necessary, to equalize the value of the paper currency and the coin, by either raising the denomination of the latter to 130 livres the marc, or reducing the former to one half. This absurd notion prevailed in the council, and it was resolved to diminish the value of the bank notes, and the India Company's *actions*, that a just proportion between them and the coin might be maintained. For that purpose, an edict was issued on the 21st May 1720, ordering that shares in the company should be immediately reduced to 8000 livres; on the 1st July to 7500 livres; on the 1st August to 7000 livres; and so on by 500 livres a month till the 1st December, when they were to remain fixed at 5000 livres. It ordered also that bank notes should be reduced in the proportion as 10 is to 8; but that on the 1st of July they should be farther reduced; those of 10,000 livres to 7500, and so on monthly, at the rate of 500 livres, until the 1st December, when they should remain fixed.

This impolitic and disgraceful measure was accompanied with corresponding consequences. The notes lost all credit, and the whole paper fabric, in a moment, fell to the ground. Mr Law's system was overthrown, and in its ruin, involved thousands who had converted their property into bank currency, on the faith of the declarations of government, which had solemnly engaged, that whatever alterations should take place on the coin, the bank notes should always remain invariable, and be paid in full.

At this time, the amount of notes in circulation were not less than 2,235,085,590 livres, and as they would not pass for any fixed value, the distress of the public became extreme; so much so, that the people were driven almost to despair, and threatened the very existence of the government. To alleviate, in some degree, the calamities, which the regent and his council had so imprudently brought upon the country, the bank, which had been shut on the 27th May, under pretence of examining the accounts, was again opened on the 10th June for the payment of notes of 10 livres; and notes of 100 livres were to be changed into small notes, but only one to be brought by each person coming for that purpose. The 17th July was appointed for the payment of notes of 100 livres; but the concourse of people who wished to exchange notes was so great, and so many obstructions were thrown in their way, that a scene of riot and confusion took place, which was only suppressed by a military force.

To absorb, however, the immense quantity of paper with which France was deluged, government had recourse to the plan of granting annuities to the holders of bank currency. Accordingly, 25,000,000 of perpetual annuities at the rate of forty years purchase, and 4,000,000 on livres, at twenty-five years purchase, were constituted. Books of accounts current, and transfers of 600,000,000 were opened at the bank, and in August, 8,000,000 more of perpetual annuities, at the rate of fifty years purchase, were issued. By these methods, it was expected that 2000 millions of notes would be retired; but notwithstanding the discredit of the paper currency, the unfavourable nature of the terms made several people hesitate. It was therefore thought necessary to publish an edict on the 15th August, that notes of 10,000 and 1000 livres should have no currency except for the purchase of annuities and bank accounts, or for the supplemental payments directed to be made on the *actions*; and by a subsequent edict, all payments in notes were prohibited on the 1st of November 1720.

Thus terminated Mr Law's celebrated banking system, which, though founded on principles calculated to ensure its stability, could not resist the folly or perfidy of a despotic government. But France had reaped some advantage from its establishment, in her agriculture, her manufactures, and commerce; and the people had in general become more industrious and better acquainted with the principles of trade, in consequence of the abundance of the circulating medium, which this establishment had afforded.

It is unnecessary to pursue our inquiries, as to the banking establishments of the French, through the period of the revolution; as a new and important institution for that purpose, under the sanction of the Imperial Republic, has superseded all others in France.

The regulations of this bank were decreed by the law of the 24th Germinal, year XII. (1804), and are as follows:

1. The association formed in Paris under the title of the *Bank of France*, shall have the exclusive privilege of issuing cash notes upon the conditions mentioned hereafter.

2. The capital of the bank shall consist of 45,000 shares, at 1000 franks per share, (£1,800,000 sterling, at 25 franks for 20s. English) as primitive capital, subject to increase through the medium of *reserved* funds.

3. The bank shares shall be filled up with the name of the holder, and not be made payable to the bearer.

4. The amount of each share shall not be less than 500 franks.

5. The bank shall discount bills of exchange, notes, or bonds. The bank, however, shall not carry on any kind of commerce except in money matters; neither shall it discount any but such bills, &c. as it shall deem good, or conceive real value to have been given for.

6. Discount shall be charged in proportion to the number of days the bills, &c. shall have to run.

7. The being a stockholder shall not be considered as bestowing any particular right to, or exemption from, discount.

8. The annual dividend, computing from the 1st Vendemiaire, 13th year, shall not exceed 6 per cent., and shall be paid half yearly. The benefits over and above the annual dividend shall be converted into funds of reserve in the 5 per cents. consolidated. The dividends of the last six months of the year XI. shall be regulated according to ancient usages of the bank. The dividend for the year XII. shall not exceed 8 per cent.

9. The 5 per cents. consolidated, acquired by the bank, shall be entered in its name, and shall not be sold without its authority during the term of its privilege.

10. The representation of the whole of the stockholders shall be vested in 200 persons from among themselves, who shall form the general assembly of the bank.

11. The 200 stockholders, who shall compose the general assembly, shall be such as the bank shall deem fit for that purpose; and the preference in choosing shall be given to the oldest stockholders.

12. The general assembly shall be convoked each year in Vendemiaire, and shall be obliged to meet on other extraordinary occasions.

13. The members of the general assembly shall assist and vote in person, and shall employ substitutes. Each member shall have but one vote, whatever number of shares he may hold.

14. No person shall be eligible as a member, unless he actually be a citizen of Paris.

15. The affairs of the bank shall be managed by 15 directors, and superintended by three censors chosen from the body of the stockholders by the general assembly. The censors and directors shall form the general council of the bank.

16. The directors and censors shall be annually changed.

17. Seven directors out of fifteen, and the three censors, shall be manufacturers or merchants who hold bank securities.

18. There shall be formed a discount council, composed of twelve members chosen from such of the stockholders as are engaged in commerce in Paris. These twelve shall be nominated by the three censors, and shall annually be changed. The members of the council shall manage the discount concerns, and shall have a deliberative voice.

19. The directors, censors, and members of the discount council, who go out of office annually, may be re-elected.

20. The services of the directors, censors, and members, &c. shall be gratuitous.

21. The council shall nominate a central committee, composed of three directors, one of whom shall be named president; and in this character he shall preside over the general assembly, the general council, and all the committees at which it shall be deemed necessary for him to assist.

22. The president shall hold his office for two years. One or other of the two remaining members of the committee shall go out of office annually, but they may be all re-elected.

23. The central committee is especially and exclusively charged with the direction of the whole operations of the bank.

24. It is moreover bound to keep an account of such as partake of the discounts, and to make such alteration in this respect as it shall judge necessary to be made. This statement will serve as a sort of government for the distribution of discount.

25. Those persons who may have cause to complain, relative to the distribution of discount, must apply for redress to the central committee and to the three censors.

26. The censors shall declare the result of their superintendance at such general assembly, and say whether the discount regulations have been properly observed.

27. The actual general council is bound to make the necessary statutes for the internal administration of the banking affairs within a month.

28. The privilege of the bank is to last for 15 years from the 1st Vendemiaire, XII. year.

29. The directors and censors of the bank of France shall preserve their titles, and exercise their functions during the time fixed by the statutes and regulations.

30. The Caisse d'Escompte du Commerce, the Comptoir Commercial, the Factorerie, and other associations at Paris, which have issued bonds, bills, &c. shall not from the date hereof issue similar or any other bonds, &c. but shall take care to call in all such as are now in circulation, previously to 1st Vendemiaire next.

31. No bank shall be formed in any of the departments unless under the authority of government; and even then shall be restricted to the issuing of notes to a certain amount. The articles 3d, 5th, 6th, 13th, 24th, 25th, shall be applicable to the banks of the departments.

32. No exception shall be made to the sums of accounts current in the privileged banks.

33. Judicial actions relative to banks, shall be instituted and carried on in the names of the directors of the bank of France.

34. An annual agreement may be made with privileged banks for the stamping of their notes.

35. And lastly, any persons forging notes similar to those of France or other privileged banks, receiving such notes knowing them to be forged, shall be liable to capital punishment.

The rules or regulations of this bank are well calculated for its security and prosperity; but whether any institution of the kind can flourish in a despotic country, where the funds are liable to be diverted from their original purpose by the influence of power, is extremely questionable. It is well known, that all mercantile associations derive their stability and credit from a strict observance of the rules by which they are constituted, as the confidence of mankind can be firmly placed only on what is known, fixed, and determinate; and there are no establishments which ought to be more inviolable than those of banking companies.

Advantages of the Banking system.

It is universally acknowledged, that arts and manufactures have been brought to great perfection by the division of labour; and it is equally true, that a *circulating medium*, by representing property in all its divisions, enables the community to exchange the products of their industry with ease and facility. As the operations of commerce are therefore not confined to the barter of the *ipsa corpora*, or, the mere exchange of one commodity for another; but can be transacted by the subtilty of an active agent, that occupies little space, yet comprehends value to any supposable amount, the production of the articles of consumption must be greatly multiplied and varied. The comforts, the luxuries, and the enjoyments of mankind are thus encreased, and the whole society obtains an addition to its happiness. If such beneficial consequences result from a circulating medium, it will be admitted, that the society which possesses an abundance of it, or the means of augmenting it, by a process that encourages its production, must be wealthy and prosperous; and such is the society of Britain. Our industry, our skill and ingenuity, could not be fully exerted, nor the productions of the arts, manufactures, and commerce of the community generally diffused, without the intervention of a circulating medium, which representing every species of property, combines the individual exertions of men, and links, in one great chain, their separate efforts for the common happiness of all. The facility of transacting the exchange of one commodity for another, by means of a generally acknowledged representative of value, is exemplified by the following case:—An agriculturist in the north of Scotland, may exchange the produce of his labour with that of a Yorkshire manufacturer, by selling a quarter of wheat at home for a bank note, and purchasing cloth with it, from a neighbouring haberdasher. The *value* of the wheat, or what is the same thing, a symbol of its value, may be thus conveyed in a letter, whereas, the delivery of the commodity itself might incur an expense equal to its original price. In this case, we find an illustration of the general principle on which commerce depends, as well as a convincing instance of the vast utility of a circulating medium.

Before the discovery of the use of money, as an instrument for ascertaining the comparative value of commodities, the exchange of the produce of one country with that of another, must have taken place, by the delivery of the commodities themselves; and even after an imaginary value was attached to the precious metals, their conveyance from one quarter of the world to another, must have been attended with great inconveniency, risk, and danger. But when commerce became more general, in consequence of the progress of civilization, and embraced the productions of countries remotely situated, a substitute for money, that could be easily carried, or if lost, speedily recovered, produced effects, that united the arts and ingenuity of nations the most distant. Bills of exchange, which were introduced into Europe towards the close of the 12th century, have accordingly effected every purpose that could have been accomplished by an abundance of gold and silver; and they are now the only means of payment among commercial men, excepting in cases, where the precious metals, from particular circumstances, are an article of profitable merchandize. To explain the principle on which depends the importance of a bill of exchange, it is only necessary to recur to daily experience. A trader in London, for example, can pay a cargo of wheat to a merchant in Russia, by transmitting to him a bank of England bill, which would pass in that country for value, from the well founded conviction that it may be ultimately resolved into gold, or into any commodity that gold could purchase. The utility of banks, therefore, arises from their affording a circulating medium representing property, the quantity of which is only limited by the necessity that occasions it, or in other words, by the demand induced, by the diversified operations of commerce. As this substitute
for money can be fabricated at little expen
be deemed an artificial and inexhaustible
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together supplanting them as a circulating
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The establishment of banking companies
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produced the happiest effects, by affording t
of promoting and extending agriculture, manu
and commerce; but no where has the sys
carried to such an extent as in Scotland, in p
to the industry, riches, and population of t
try. In Scotland, banks are properly estab
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wide field, comprehending the borrowing an
of money, buying and selling bills of excha
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solvent men; and this constitutes what i
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Scotch banks borrow money at 4 or 5
interest payable on demand, which enable
extend their trade, and to occupy capital th
be otherwise unemployed. They discount
London and other places at distant dates, an
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From this branch of the business, they deri
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gains one penny sterling, because it received
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elsewhere at a distance, form another source
to Scotch banks; for they buy drafts in L
20 or 30 days premium, and sell at 40 or 5
The expense of agency, no doubt, reduce

fits of Scotch banks; but as they never keep gold or silver in their repositories equal to the amount of their notes in circulation, an agent in London, to accept and pay their drafts, is indispensibly requisite; for they must be able to give bills on London to all claimants who will not be otherwise satisfied, or to convert their own drafts into cash in case of urgent demands. Country banks generally establish an agency in London, by investing their capital and borrowed money in the public funds, under the controul of the agent, who is thus secured for the amount of his engagements on account of the bank. The advantage of this plan is, that the bank obtains interest for its capital and borrowed money, and at the same time, in cases of emergency, can convert the whole into cash by the sale of stock. By judicious management, and especially by taking care to purchase a surplus of bills on London, a private bank may be conducted with very little capital in Scotland, where the facility of carrying on the business, has induced the erection of many of them; but their operations are beneficial to society at large, and the advantages of an abundant currency are evident, from the growing wealth and prosperity of the country.

See Macpherson's *Annals of Commerce*, vol. i. p. 341, et seq. *Ibid.* vol. ii. p. 253, et seq. Smith's *Wealth of Nations*, vol. i. p. 480; vol. ii. p. 220, et seq. Allardice's *Address to the Proprietors of the Bank of England*, p. 130, et seq. Fairman *on the Funds*, p. 43. Allardice, p. 76. *Ibid.* p. 131. *Life of Law.* (T)

BANKOK, one of the chief towns of the kingdom of Siam, situated in an island about seven leagues from the sea, near the mouth of the river Menam. In the end of the 17th century, the French had an establishment in Bankok, consisting of two companies of 40 men each, in a square fort on the other side of the river; but they abandoned it in 1685. The vessels of all the nations that trade with Siam are obliged to pay duty here, and to give an account of their cargo and crew. The passport which they receive from the custom-house officer is shewn at a small village called Canon-Bautenan, which is about an hour's journey from Juïda; and if there appears to be no fraud, they are permitted to trade in every part of the kingdom. (*j*)

BANKRUPTCY, in its more general and extended sense, may be defined insolvency, actual or presumed, followed by some open and public act denoting that the insolvency is irretrievable. He is a bankrupt "*Qui fortunæ vitio vel suo, vel partim fortunæ partim suo vitio, non solvendo factus, foro cessit.*" Cicero, 2d Philip.

In the early ages of a state, the law of bankruptcy is uniformly cruel and oppressive. The unfortunate debtor is regarded as a criminal, without distinguishing whether his inability has arisen from culpability or from misfortune; and the law looks merely to the interest of the creditor, without paying any regard to the feelings or to the future comfort of the debtor. The severity of the Roman laws against debtors in the infancy of the republic, and the oppression of creditors, which occasioned so many popular insurrections and so many secessions to the *Mons Sacer*, are known to every one. As states advance in civilization, and as commerce becomes more extended, less illiberal notions prevail, and the innocent trader, reduced to bankruptcy by misfortune, becomes an object of compassion rather than of severity. Creditors too begin to see, that it is for the public interest that the funds of the bankrupt should belong to the creditors at large, instead of being left to be scrambled for by the diligence of individuals; and through the frequency of failures which attends the growth of commerce, the principles of the bankrupt law are examined and matured into a regular system. The great fundamental principle upon which every code of bankrupt law must rest is, that from the moment of the failure, the funds of the bankrupt become the common property of his creditors at large, and are no longer liable to be disposed of by himself, or to be attached by individual creditors. The perfection of every code must depend upon the manner in which this principle is carried into effect, by the adoption of a simple, economical, and speedy mode of distributing the common fund.

It was not till a very late period that the bankrupt law of Scotland assumed a systematic form. We, indeed, at an early date, adopted from the Roman law the mild remedy of the *cessio bonorum*, by which an honest though insolvent debtor, who was willing to surrender all his effects to his creditors, escaped the hardship of a long imprisonment; and by the statutes 1621, c. 18, and 1696, c. 5, attempts were made to prevent insolvent debtors from granting any deeds in defraud of their creditors. By this last statute, bankruptcy was accurately defined, and its date being fixed, a presumption of law was established against all deeds granted within 60 days of it, in favour of prior creditors. Still, however, no plan was devised for a general distribution of the bankrupt's effects. The creditors were left to proceed with their individual diligence as they best could, and the maxim of law being "*Jus civile vigilantibus scriptum est,*" an unfortunate debtor was, on the first suspicion of insolvency, overpowered with a torrent of diligence, which even the best credit could scarcely withstand. The great increase of commerce during the last century, and the consequent frequency of failures, imperiously called for an alteration of this system, and after a variety of experiments, the plan which is now in execution was adopted, by the statute 33 Geo. III. c. 74. This statute, though merely temporary and experimental, has been repeatedly renewed; and the system which it establishes, although perhaps still capable of considerable improvement, is admitted on all hands to possess great and peculiar excellencies.

By the statute 1696, c. v. any person may be rendered a bankrupt who is at the time in Scotland, and subject to its laws. The effect of this bankruptcy against persons who are not traders, is only such as to enable creditors to challenge undue preferences, and to follow forth the ordinary processes for attachment and distribution of the funds. But by the 33d Geo. III., a new process called sequestration is introduced, by which the whole estate of a bankrupt *trader* is adjudged from him, and vested in a trustee for the creditors at large. The statute describes the persons liable to bankruptcy by sequestration, to be "in general, any person who, either for himself, or as agent or factor for others, seeks his living by buying and selling, or by the workmanship of goods or commodities." All persons capable of entering into trade, are liable to sequestration; peers and others having privilege of parliament; unmarried women and widows coming under the description, and also married women who carry on trade or merchandise independent of their husbands. Trading companies may also be sequestrated. The statute makes the following exceptions: holders of India stock, or stock in any of the banks established by public authority, or in the Friendly Insurance Company, the Forth and Clyde navigation, or other inland navigations, or the British fisheries, common labourers or workmen for hire, landholders and tenants of land, or husbandmen, if such persons be not otherwise *bona fide* under the foregoing description. A grazier, though he also be a tenant, may be sequestrated, if he deals in cattle not the produce of, nor grazed upon, his own farm. A foreigner who has traded to Scotland, or a Scotsman domiciled abroad, cannot be sequestrated although found in Scotland.

Such are the persons liable to sequestration. It is next to be considered, from what acts bankruptcy is inferred, so as to authorise this process. Where the debtor himself concurs, no proof of bankruptcy is necessary. Where he does not concur, the creditor must shew that certain steps of diligence have been taken against him. These are, That the debtor shall be under diligence by horning and caption for debt, and shall either, in virtue thereof, be imprisoned, or retire to a sanctuary, or fly or abscond for his personal safety, or defend his person by force; or being out of Scotland, and not liable to be imprisoned, by reason of privilege or personal protection, shall be under diligence by charge of horning, attended with arrestment not loosed, or poinding of any part of his moveables, or decree of adjudication of any part of his estate, for payment or security of debt, at the instance of any creditor.

When a person comes under the description of the statute, and has been rendered bankrupt by the use of any of the diligence just mentioned, any one creditor, to the amount of £100, or two creditors to the amount of £150, or three or more to the amount of £200, either with or without the concurrence of the bankrupt, may apply by summary petition to the court of session for a sequestration. Where the bankrupt concurs, sequestration is immediately awarded; where he does not concur, a warrant is granted for serving the petition upon him, and if he does not appear, and shew cause to the contrary, sequestration is awarded against him. The court at the same time appoints the creditors to meet and choose an interim factor for managing the estate, and also appoints a subsequent meeting for choosing a trustee. When the factor is chosen, he has power to take possession of the whole estate, books, and vouchers of the bankrupt, who is bound to grant powers of attorney, for recovering any effects he may have abroad. At the next meeting ordered by the court, which must be within six weeks, and not less than four of the first deliverance on the petition for sequestration, the creditors who have produced their grounds of debt, and affidavits to the verity, proceed to elect a trustee, to whom the estate may be assigned for the g hoof. This trustee is to be chosen by a m the creditors in number and value. Two may be chosen to act, the one failing the o one only can act at the same time. At thi the bankrupt must exhibit a state of his af the interim factor must also produce an a his management.

The trustee must find security to the cre his faithful management; after which the Session, upon application, will confirm hi tion, and he is then authorised to take pos and uplift the estate of the bankrupt, and the interim factor. The court at the same points the bankrupt to grant a regular conv his whole estate to the trustee under the pai dulent bankruptcy, and failing his doing court may commit him to prison. Whe conveyance be granted or not, the whole adjudged by the court to be vested in the t behoof of the creditors.

The trustee must, within eight days o pointment, apply to the sheriff to fix two the examination of the bankrupt, upon al relating to his affairs. The bankrupt's others of his family, and any other person with his affairs, may also be examined. A of these examinations, the bankrupt must oath that he has exhibited a full state of hi and failing his doing so, he shall be guilt crime of fraudulent bankruptcy, and pun cordingly, and rendered infamous. The tr apply to the court to grant protection bankrupt from diligence to enable him to a minations, and to assist in recovering his es while so employed, the creditors may give lowance for his support not exceeding two week.

A general meeting of the creditors is t the first lawful day after the last examinati bankrupt, for the purpose of instructing t as to the management of the estate. At t ing three commissioners are to be chosen the accounts of the trustee, to fix the com which he shall be intitled, and to advise a with him in compromises and submissions bankrupt's estate.

It is the duty of the trustee to recover vert into cash, as soon as possible, the est bankrupt, which shall be a fund of divisi those who were creditors prior to the seq All preferences or conveyances in security debts, which have been granted by the ba prior creditors within sixty days of the a for sequestration, are presumed to have be lent, and are liable to be reduced; and ments and poindings used by individual within the same period, are void, and give ence, except that the *bona fide* arrester or entitled to retain his expenses of diligence per cent. more on the price or appraised v *bona fide* transactions with the bankrupt i ing and selling of goods, and paying or re money, previous to the sequestration, are challenge.

The trustee must keep regular accounts, and lodge the money recovered in a bank; and at the end of twelve months from the date of the first deliverance, after due advertisement, a dividend shall be paid to those creditors who have produced their grounds of debt and affidavits. When the term of payment of any debt is not arrived, a proportional discount shall be made, and the debt ranked accordingly. Where a debt is contingent, a dividend corresponding to the debt shall be set aside and deposited in the bank until the contingency be declared.

At the end of eighteen months a second dividend shall be made; and in like manner, dividends at the end of every six months, till the whole funds be divided. But at the expiry of a year and a half from the sequestration, four-fifths of the creditors may order the whole outstanding debts, &c. belonging to the estate to be sold, for the purpose of making a final division.

After the second dividend, the bankrupt, with concurrence of the trustee and four-fifths of the creditors in number and value, may apply to the court, who are authorised to grant him a final discharge of all debts contracted prior to the sequestration, if cause be not shewn to the contrary.

As it is sometimes for the advantage of all parties to settle by composition, the statute declares, that the bankrupt may, at the meeting after his second examination, offer to settle by composition; and if this offer is approved of by nine-tenths of the creditors present, another meeting shall be called to consider of it; and if at this second meeting nine-tenths of the creditors approve of the offer, a report of the proceedings shall be laid before the court; and if it shall appear that the offer is reasonable, and has been assented to by nine-tenths in number and value of the whole creditors who have produced grounds of debt, the proceedings in the sequestration shall cease, and the court shall declare the trustee exonered, and the bankrupt discharged, except as to the payment of the composition.

Such are the general outlines of the law of bankruptcy in Scotland. It resembles that of England in some of its general features, though there is a strong and marked distinction betwixt the two systems in many particulars.

In England *traders* only can be made bankrupt. The effects of every other description of persons are left to the remedies of common law, and to be attached and carried off by the diligence of individual creditors.

Certain acts are defined by the different statutes, as marks of bankruptcy, some of which are of an ambiguous and some of a secret nature, such as the debtor "beginning to keep house," so as not to be seen or spoken to by his creditors. The commission of any one of these acts invalidates all the debtor's future transactions, and entitles a creditor to a certain extent to apply for a commission of bankruptcy, which is immediately granted of course, by the Lord Chancellor, vesting the bankrupt's estate in certain commissioners, who are empowered to lock up his shop, and to order his person into custody to undergo the necessary examinations. As this commission is granted without the knowledge of the bankrupt, and is meant to come suddenly upon him, certain precautions are used to prevent its being maliciously sued out.

The commissioners take proof of the bankruptcy, and of the debtor's being a trader, and appoint three meetings to be advertised. At these meetings the debts are proved; and at one of them assignees are chosen, in whom the estate is vested for behoof of the creditors. At the third meeting at farthest, the bankrupt must surrender himself, and afterwards conform to the statutes in all respects, under pain of death.

The bankrupt and those connected with him, are to be examined as to his affairs; and if their answers appear unsatisfactory, the commissioners may commit them to prison till they submit and give satisfaction.

The whole estate of the bankrupt is vested in the assignees, as it stood in his person when the first act of bankruptcy was committed. After that date, therefore, all his transactions are void and null. It is, however, now provided by Sir Samuel Romilly's bill, 46 Geo. III. 135. that all conveyances, all payments by and to, and all contracts and dealings by and with a bankrupt, made more than two calendar months before the date of the commission, shall be valid, notwithstanding any prior act of bankruptcy, if the person so dealing had not at the time any notice of such prior act. It was provided by 19 Geo. II. c. 32., that no money paid by a bankrupt to a *bona fide* real creditor in the course of trade, even after an act of bankruptcy, should be liable to be refunded.

When the assignees have recovered all they can, they must after four, and within twelve months, give notice of a meeting for a dividend. The commissioners then direct the dividend to be issued at so much a pound.

Within eighteen months from issuing the commission, a second and final dividend is ordered, if there be any thing remaining; and if there be a surplus after all the debts are paid, it belongs to the bankrupt.

If the bankrupt conform in all respects to the statutes, and if the creditors, or four-fifths of them in number and value, will sign a certificate to that purport, the commissioners are to authenticate the same, and transmit it to the Lord Chancellor, who, upon oath made by the bankrupt, that it was obtained without fraud, may allow the same, or disallow it on cause shewn by any creditor. If it is allowed, the bankrupt is entitled to an allowance out of his effects to put him in a way of industry. This allowance is proportioned to the amount of the dividend on his estate, but must never exceed £300. The bankrupt is also, by his certificate, discharged for ever from all claims for any debts which were proved or proveable under the commission.

When a person has obtained a certificate, and becomes bankrupt a second time, unless he shall pay fifteen shillings a pound, he shall only be indemnified as to confinement of his body; but his future estate shall be liable to his prior creditors.

Such is the law of England regarding traders. All other persons remain subject to the common law, both as to their person and effects. They are liable to perpetual imprisonment, unless relieved by the in-

[illegible] that, by the provisions of [illegible]. By this statute it is [illegible] under [illegible] may [illegible] of liberation, which [illegible] creditors all his [illegible]. Had the enactment [illegible] here, it would have been [illegible] provision, equal in [illegible] to the Scots process of [illegible]; but it goes on to declare, that if the [illegible] shall [illegible] to the liberation, and [illegible] an aliment to the debtor, [illegible]. See Bell's *Commentaries on the Law of Scotland* [illegible] *Bankruptcy*; and [illegible] *Treatise on the Bankrupt Law of England*.

BANKSIA, [illegible] of plants of the class Tetrandria, and order Monogynia. See BOTANY. (w)

BANNAT, a district of Hungary, lying between the river Maros and the Danube. See HUNGARY. (j)

BANNERETS, an order of knights, next in dignity to the barons, and entitled to lead their vassals to battle in the royal armies under their own banner or flag. By this privilege they were distinguished from the knights bachelors, who were obliged to march under the banner of a superior. The origin of the name seems wonderfully simple, being obviously no other than banner, a square flag; and this etymology is supported by all the other appellations by which the bannerets were distinguished, such as *milites banneretti*, [illegible], *bannerarii*, &c. But the origin of the order, like every thing uncertain, has given rise to much controversy among antiquarians. Some contend that this dignity first originated in France, while others assign that honour to Britain, [illegible] to England. Those who are of the last opinion ascribe the order of bannerets to Conan [illegible], or Maximus, who commanded the Roman forces in England under the reign of Gratian. Revolting from his government, say they, he portioned out England into forty cantons, over which he appointed forty knights, with power to assemble, when necessary, under their own banners, as many [illegible] as they could muster in their several [illegible]. Without pretending to decide as to the [illegible], we can say, with sufficient certainty, that [illegible] in the last knight banneret, Sir John Smith, who was invested with that dignity by Charles I. after the battle of Edgehill, [illegible] for his bravery in rescuing the royal standard from the rebels.

In feudal times none could obtain the dignity of knight banneret, except gentlemen of family, whose property enabled them to bring into the field fifty men at arms, with the suitable complement of archers and crossbowmen, amounting in all to one hundred [illegible]. This honour was in general conferred on those who had distinguished themselves by their valour in the field. The king, at the head of his victorious army, and surrounded by all his nobles and field officers, summoned the hero to repair to the royal standard, which was displayed on purpose to receive him. He was conducted to his sovereign by two knights of [illegible], of approved bravery, bearing in his hand his pennon or guidon of arms, and [illegible] the two heralds, who proclaimed his gallant
exploits. When he came into the royal pı
the king desired him to advance his banner
commanded the ends of his pennon to be t
which, being thus made square, was convert
a banner. Martial music attended him as he r
to his tent, to which he was accompanied b
of the nobility and principal officers, for w
sumptuous banquet was prepared. This hon
tended as the peculiar reward of personal ga
lied with the individual who had earned it; a
ther the title nor supporters of the knights ba
were hereditary. In the 28th of Edward I. a
banneret had four shillings of daily pay, and
at court; and was entitled to take precedence
younger sons of viscounts and barons. (μ)

BANNOCKBURN, a small rivulet abou
miles from Stirling, on the road to Edinburgl
brated for a great battle fought on its banks b
the English and Scots armies, in the reign
ward II.

Robert Bruce, grandson of that Bruce w
Baliol's competitor for the crown of Scotlar
resolved at once to rescue his country from th
dom into which it had been reduced by tl
Edward, and to vindicate his own claim
throne, now vacant by the demise of John
The minds of the Scots people had been
alienated from that monarch by his pusilla
submission to Edward, and his desertion of th
and interests of his own subjects; and his son
soner and an exile, was in no condition to re
claims of his family, now generally abandoned
escape of Bruce from the English court, to w
had accompanied Edward I. after his victoriou
dition into Scotland, restored to new energy the
ing spirits of his countrymen; and the latent i
tion with which they bore the tyranny of the
monarch, now burst forth in the avowed resol
regain their national independence, or to p
the attempt. The English were attacked
quarters; many of their garrisons were reduce
the authority of Bruce being universally a
ledged, he was solemnly crowned and inau
as king of Scotland. But his resources w
slender to support him against such an antag
Edward. An immense army was speedily sent
him; and a furious conflict took place, in
Bruce, after displaying the most heroic valo
overpowered by the superior numbers of his e
and forced to take refuge, with a few attenda
the Western Isles. While Edward was hastenin
an overwhelming force to complete the final s
tion of the Scots, and to deprive them of all p
future revolt, he was seized with a mortal dis
at Carlisle; and with his last breath enjoined
to make the reduction of Scotland the first an
cipal enterprise of his reign. The death of th
like monarch, and the weakness of his successo
more restored the hopes of the Scottish natio
Robert, who had already left his fastnesse
gained some important advantages, soon s
standard surrounded with a band of faithful
rents, burning with revenge against their Engl
pressors, and united in the resolution to con
die. In a short time the English were drive
all their strong holds, except the castles of S

Berwick, and Dunbar; even the frontier provinces of England were ravaged by the triumphant Scots; and Edward, roused at length from his lethargy, determined to muster the whole force of his kingdom, and, by one decisive blow, to quell for ever a people whom he found such inveterate and troublesome enemies. For this grand enterprise troops were even enlisted in Flanders and other foreign countries: his military vassals in Gascony, Ireland, and Wales, were summoned to repair to the royal standard; and the whole military force of England was commanded to assemble, on a stated day, at Newcastle upon Tyne. At length, on the 18th of June 1314, he began to march from Berwick, with an army of more than a hundred thousand men; followed by an incredible train of waggons, loaded with all sorts of provisions. Scotland had been so much exhausted by its recent wars, that Robert, with all his efforts, could not bring into the field more than thirty thousand men; but they were men of tried valour, inured to all the hardships and vicissitudes of war, and headed by a prince whose undaunted courage was seconded by the cool self-command, and consummate skill of an experienced general. The castle of Stirling had for some time been invested by Edward Bruce; and the governor, Philip de Mowbray, after a gallant defence, was compelled to capitulate, and promised to open the gates of the castle on a certain day, if he should not be relieved before that time by an English army. Aware, then, that Edward would advance immediately towards Stirling, Robert determined to intercept him on his march; and fixed upon a most advantageous position, where he waited to give him battle. He had a hill on his right hand, a morass on his left, and a rivulet in front. As the English were greatly superior to him in cavalry, he employed a very ingenious stratagem to deprive them of this advantage. He commanded deep pits to be dug along the banks of the rivulet, in which were fixed sharp pointed stakes; and the whole was carefully covered over with turf and rushes. On the evening of the 24th of June, the English arrived on the opposite bank of the river; and the two armies, fired with all the rancour of national animosity, rushed immediately to battle. A smart conflict ensued between two bodies of cavalry. That of the Scots was headed by Robert in person, who engaging in close combat with Henry de Bohun, a gentleman of the family of Hereford, with one stroke of his battle-axe cleft his adversary to the chin. The English horse fled with precipitation; and the Scots, exulting in the valour of their monarch, regarded the favourable result of this encounter as a presage of a more complete victory.

Darkness gave a short respite from hostilities; and never was suspense more interesting than that in which the armies were now placed. The English, elated with former victories, and exasperated by the least appearance of defeat from a people whom they had already considered as subdued, longed eagerly for a combat which was to annihilate the power of their enemies. The Scots saw their independence, and even their existence as a nation, depending on the issue of a single battle; and undaunted by the gigantic power of their enemy, were determined to restore the liberty and the glory of their country, or not to survive its fall. The night, short as it is at that season of the year, appeared extremely tedious to the impatience of the combatants. At break of day Edward drew out his army, and advanced against the Scots. His nephew, the Earl of Gloucester, who commanded the left wing of cavalry, impelled by the ardour of youth, and disputing the post of honour with the Earl of Hereford, rushed impetuously to the attack, and fell among the covered pits which Bruce had prepared on the bank of the river. Gloucester himself was dismounted and slain; his cavalry were thrown into disorder; and Sir James Douglas, who commanded the Scottish body of horse, giving them no time to recover from their consternation, drove them off the field with great slaughter. The infantry, alarmed by this unfortunate commencement of the action, and afraid of some similar stratagem against themselves, were yet hesitating to advance, when they perceived another army marching slowly along the heights as if with the intention of surrounding them. This was a number of waggoners and sumpter boys, whom Robert had provided with military standards, so as to give them at a distance the appearance of a large army. The stratagem succeeded: the English, distracted by various fears, threw down their arms and fled; the slaughter was prodigious; and as they were at least eighty miles from any place of safety, very few of them would have escaped, had not the Scots returned from the pursuit to seize on the rich spoil of the English camp. Various accounts are given of the number slain in this decisive battle. Some of the Scottish historians assure us that fifty thousand English perished in the action, or were destroyed in flight; and, according to the most moderate calculations, the number of captives amounted to 154 lords and knights, 700 gentlemen, and 10,000 common soldiers. During the whole of the engagement Edward shewed no want of personal bravery, and was with difficulty persuaded to quit the field. He was closely pursued by Sir James Douglas, who was eager to revenge the wrongs of his family; and narrowly escaped by reaching Dunbar, whose gates were opened to him by the Earl of March; and from thence he took shipping for Berwick. The loss of the Scots, too, was by no means inconsiderable; for even their own writers allow that 4000 of them fell, among whom there were only two of equestrian rank.

Such was the great battle of Bannockburn, which completely secured the independence of Scotland, established the family of Bruce on the throne, and inspired the English with such a dread of Scottish valour, that for many years they never would venture to oppose any number of Scotsmen in the field. Robert availing himself of his present advantage, marched directly to England, and ravaged, without opposition, all the northern counties; besieged Carlisle, and took Berwick by assault. In return for some of his noble prisoners, he received his wife, his daughter, and sister, and all the Scottish nobles and gentlemen who had been prisoners since the reign of Edward I.; the liberty of his other captives was purchased at immense ransoms, which were a new accession of wealth to the kingdom. See Hume's *Eng-*

Bannockburn.

land; Henry's *Britain*, vol. vii. p. 139—144. Buchanan's *Rerum Scoticarum Historia*, cap. 97. (*k*)

BANTAM, a seaport town, and the capital of a kingdom in the north-west extremity of the island of Batavia or Java. It is situated at the foot of a mountain, from which issues three rivers, one of which passes through the town, while the other two inclose it. The town of Bantam, which resembles an immense grove of cocoa nut trees, has no walls or forts excepting fort Diamond, which contains the royal residence. Each of the streets which compose the town is built with straw and rose wood, and is surrounded with a plantation of cocoa nut trees. The river of Bantam, which is very shallow, is about 175 feet wide at its mouth; and the bay of the same name affords a commodious and secure anchorage.

Before the inhabitants of the East were visited by the rapacious merchants of Europe, Bantam was one of the most commercial cities in the Indies. The Arabs, the Turks, the Moors, the Chinese, and almost all the Asiatic nations, resorted to this celebrated rendezvous. The Portuguese were the first Europeans that traded with this city; and the English afterwards established a factory in it, and for a long time carried on a lucrative commerce. Another establishment was formed by the Dutch, but they did not succeed so well as the English in gaining the affections of the natives.

The transference of the trade of the Dutch to the neighbouring province of Jacatra, which they had conquered, and where they built the town of Batavia; the removal of the English to Hindostan and China; the ruin of the bay by the coral shoals and the detritus of the mountains; and the destruction of a considerable part of the town by fire, all conspired to reduce the opulence and the commerce of Bantam. The power of its king diminished with the commercial importance of his capital; and in employing the aid of the Dutch against the other kings of Java, he lost his own independence. With the form of royalty he resides as a kind of state prisoner in the Dutch fort, surrounded with female attendants. When he appears in public, he is attended by his Bantam life guards, and likewise by a body of Dutch troops from the garrison. None of the life guards are admitted within the fortress; and neither his subjects nor his children are allowed to approach him without the permission of the Dutch officer.

The king of Bantam maintains a body of native troops, and several armed vessels, for supporting his authority over a territory in the south part of the island of Sumatra. His subjects in Sumatra and Java, sell to the king, at a low price, the pepper which they collect; and this valuable commodity is again delivered to the Dutch at a price somewhat advanced.

Before the trade of this kingdom was monopolised by the Dutch, the Bantamese exported about three million pounds of pepper annually; and in the year 1751, when the kingdom came under the authority of the Dutch, an annual tribute of 100 bhars of pepper, or 37,500 pounds weight, was paid by the king to the Dutch East India Company.

The kingdom of Bantam in Java, is about 400 miles in circumference; but the dominion of the king extends over the province of Succadana in Borneo, the southern part of Sumatra, and all the islands in the streights of Sunda, from Prince's island to Hog's island.

Stavorinus, who, along with some of his fellow travellers, was invited to an entertainment by the king of Bantam, mentions a very singular custom. While the king sat at table, he relieved himself by frequent eructations, and as if it had been a piece of wit, or an exhibition of skill, he was imitated by all the rest of the company. This strange practice, in which his Dutch visitors would not likely be very expert, is considered by his majesty as a pleasing indication of the excellence of his fare, and of the good appetite of his guests.

The kingdom of Bantam is the least populous of any of the kingdoms of Java. It contains only about 5000 families, or about 22,000 inhabitants. From the thick forests and deep morasses, the climate is unhealthy, and the mortality great. East Long. 106°, South Lat. 6° 30′. A full account of the ancient commerce of Bantam will be found in Peuchet's *Dict. de la Geog. Commerç.* and copious details respecting the manners of the people, in Stavorinus's *Voyages*, vol. i. p. 57; and Staunton's *Embassy to China*, vol. i. p. 296. (π)

BANTRY BAY, or BEARHAVEN, a large bay in the county of Cork, on the south-west coast of Ireland, about 26 miles long, and from 3 to 5 miles broad. It is reckoned one of the finest bays in the world, and affords a secure anchorage for ships. See CORK. (*j*)

BANYAN TREE, a celebrated tree which grows in the East, and whose branches strike downwards and take root. By this means the tree, supported by a variety of trunks, often extends over an immense space. An excellent drawing of it may be seen in Hodge's *Travels in India.* (*j*)

BAOBAB, or BAHOBAB, the name of a huge tree which grows on the west coast of Africa, from the Niger to the kingdom of Benin. The circumference of its trunk is generally between seventy and eighty feet, though the height of the trunk seldom exceeds twelve feet. The branches, which are remarkably thick, shoot out horizontally to the length of fifty or sixty feet, and their extremities, being bent to the ground by their own weight, they form a hemispherical mass of foliage about 130 feet in diameter. The decayed trunks of the Baobab are hollowed out into burying-places by the negroes, for their poets and musicians. The bodies are thus preserved perfectly dry, and resist putrefaction as if they had been embalmed. A full account of this tree will be found in a paper in the *Mem. Acad. Par.* for 1761, p. 218; *Hist.* p. 77, by Adanson. (π)

BAPTISM, derived from the Greek verb Βαπτιζω, to dip or tinge, is the initiatory rite in the Christian religion. Though the words of our Saviour, recorded in Matth. xxiii. 19. are allowed to be the foundation of this ordinance, yet various opinions have been entertained respecting its origin. Whilst some maintain, that it was never practised before the mission of John the Baptist, others affirm, that we ought to look for its origin among the ancient ceremonies of the Jews. Without entering the barren field of controversy, we may be allowed

1643, it was keenly debated, whether immersion or sprinkling should be adopted; 25 voted for sprinkling, and 24 for immersion; and even this small majority was obtained at the earnest request of Dr Lightfoot, who had acquired great influence in that assembly. Sprinkling is therefore the general practice of this country. Many Christians, however, especially the Baptists, reject it. The Greek church universally adhere to immersion.

Ceremonies annexed to baptism.

The Scrutiny.

It has been said, that as the form of words, recorded by Matthew, is never afterwards employed when baptism is mentioned, an adherence to that form is not necessary. But though the express words are never copied, yet we ought not to conclude, that they were not observed. It is probable that, to be baptized into, or in the name of Christ, the words which the inspired writers generally use, were expressions employed for the sake of conciseness. As converts, in the apostolic age, were immediately admitted to baptism, a previous course of instruction was not then judged necessary. But, in the second century, Christians began to be divided into *believers*, or such as were baptized; and into *catechumens*, who were receiving instruction to qualify them for baptism. To answer for these persons, sponsors, or godfathers, were first instituted; and were afterwards, in the fourth century, extended to infants. Then the sign of the cross began to be employed, and was supposed to have singular efficacy in baptism. It is, however, foreign to our purpose to investigate the precise period when the many ceremonies, annexed to baptism, were first introduced. It will be sufficient to observe, that the following rites were all authorised by statutes or practice during the dark ages. At the beginning of Lent, the names of such as desired baptism, and were therefore called *competents*, were given in. During that season, the scrutiny was performed with prayer and fasting, which consisted of certain questions proposed by the priest, and the proper answers returned by adults, and by sponsors for infants. The principal of these were, "What do you ask? Faith. Do you renounce the devil and all his works? We do. Observe well what you say, that you may never depart from it. We will remember it." The priest, likewise, exorcised them, by laying his hands on their heads, and breathing in their faces, to expel the devil, and inspire them with the Holy Spirit. On one of the days of the scrutiny, the delivery of the creed was thus performed. After mass the bells were rung, and a deacon cried aloud; "If there be any catechumen, pagan, heretic, or Jew here, let him depart." Upon this the catechumens went out. Then the clergy retired to change their habits, and, "Come, ye children, and I will teach you the fear of the Lord," was sung. When this was done, the inferior clergy, having obtained from the priest permission to admit the children, solemnly advanced to the door, and said, "Enter, children, the house of the Lord; listen to your father teaching you wisdom." When the children were come in, the priest said, "Cross yourselves and hear the creed;" and immediately repeated it, sentence by sentence. During the whole scrutiny, the master of the ceremonies carried a branch of hazel and four ivory tablets, like the leaves of a mass book, on which were depicted the actions of our Saviour. These, which were called the pax, were given to the children to kiss while performing their devotions. Those who had undergone the scrutiny were called *elect*, or approved. On Palm-Sunday, the heads of the catechumens were solemnly washed, a ceremony called therefore the Capitilavium. When baptism itself was to be performed, they went in solemn procession, with lights and incense, and the choir singing, "Up, Lord, why sleepest thou," to the vestibule of the baptistery; where the priest commanded the catechumens to turn their faces to the west, because Satan dwelt in darkness, to stretch out their hands and say, "Satan, I renounce thee, and all thy works, and all thy pomp, and all thy worship:" then to turn their faces to the east where light resides, and to repeat the creed, either personally, or by their sponsors. The priest then took a little of his own saliva, and rubbing it on their ears and nostrils, said, *Ephatha*, be thou opened. Then he blessed some salt, and putting a little of it into their mouths, said, "Receive the salt of wisdom." After the benediction of the water, the priest went in and dipped them, one by one, once in the name of the Father, a second time in the name of the Son, and a third time in the name of the Holy Spirit. When they came out, the priest anointed their foreheads in the form of a cross; washed and wiped their feet; kissed them; gave them milk, honey, and wine; put wax tapers into their hands, a chrismal cap upon their heads, and clothed them with a white garment, which being worn on Pentecost gave that day the name of *Whitsunday*. This garment was deposited afterwards in the church, to be an evidence against such as should violate their baptismal engagements. Those who were baptized were called *enlightened*, or instructed.

By baptism, converts make a public profession of their faith in Christ, and in his religion; and are admitted into that family of which he is the head. 1 Cor. xii. 13. As water, likewise, in scripture is an emblem of the spirit, the water of baptism, clearly, though figuratively, informs them, that they ought, through the spirit, to maintain that purity of heart and rectitude of conduct, which are congenial to the purity of their religion, and the rectitude of its author. Tit. iii. 5. Rom. vi. 4. But lest we should imagine that this rite works like a charm, we are said to be saved, not by putting away the filth of the flesh, but by the answer of a good conscience; 1 Pet. iii. 21. The influence of baptism, therefore, in sanctifying the heart, must be of a moral nature, and will be easily understood, when we reflect, that every one who dedicates himself to God must be induced by every motive of duty, of interest, and of honour to purify himself, even as Christ is pure. But soon after the age of the apostles, many began to imagine that the mere performance of this ceremony procured regeneration and the pardon of sin. Tertullian taught that the holy spirit was always given in baptism; Chrysostom, that the water became unfit for drowning, and drowned the devil; and Augustin, th[illegible] washed away original sin. Hence arose the opinion that baptism was absolutely necessary to salvation, and that all infants who died unbaptized were inevitably damned. This opinion, however, was so[illegible]

nant to the feelings of nature, to the dictates of
son, and to the moral attributes of God, that it
er universally prevailed. When, therefore, the
ninistration of baptism was impossible, men were
wed to entertain some faint hopes of future hap-
ess. In some cases, likewise, the want of baptism
s compensated by the performance of other duties.
ch were martyrdom, called the baptism of blood;
pentance, called the baptism of fire; and constant
ommunicating, when a person had been admitted to
he Lord's supper on a supposition of his having been
aptized. But as these substitutes were thought
langerous, recourse was had, in doubtful cases, to
hypothetical baptism, in this form: If thou art bap-
tized, I do not re-baptize thee; but if thou art not
baptized, I baptize thee in the name, &c. Baptism
of the dead was another expedient practised by the
African church: to which may be added, baptism
for the dead, performed in this manner: When a
catechumen died, the priest advanced to the bed and
asked him if he desired baptism: upon this, a man,
who had been concealed under the bed, answered,
that he would be baptized in his stead; which was
accordingly done. But as no expedients could be
devised for washing away the original sin of infants,
their case was thought almost hopeless. It might
have been expected, that the mild and generous de-
claration of our Saviour, Matth. xviii. 14. would have
led them to a very different conclusion; yet Gre-
gory Nazianzen, and Severus, bishop of Antioch,
who entertained the most favourable hopes of them,
assigned them only a middle state. Pelagius, how-
ever, and his numerous followers, by denying ori-
ginal sin, declared them capable of salvation. The
church of Rome assert that baptism always confers
grace, and justification; but the Arminians and So-
cinians allow it only to be a sign of grace. The
hurch of England do not positively maintain the
ecessity of baptism to salvation; though the 27th of
heir articles seems to imply it. The church of Scot-
nd call it a seal of the covenant of grace, of rege-
eration, &c. but do not think it absolutely neces-
ry to salvation. Some have thought that it be-
ows immortality upon the soul: of this number was
odwell, who also maintained, that only episcopal
ptism could bestow this blessing.

The dispute, which has long agitated the church,
ncerning the proper subjects of baptism, is, unhap-
y, not yet terminated. Whilst some contend that
infant children of Christian parents have a right
baptism, others maintain that this right belongs
y to those who have been instructed in the reli-
n of Jesus, and profess their belief in his name.
t though, at the first propagation of Christianity,
who were admitted to baptism must have been of
latter description, yet when the foundations of
church were laid, the children of believers were,
doubt, admitted before they were capable of per-
al belief. As Tertullian, about the end of the
ond century, condemns infant baptism, it has been
rted, that that practice must have then prevailed
the Carthaginian church. But as the children,
tioned by Tertullian, are said to ask baptism for
nselves, it is probable that they were not infants
the strict sense of the word. It is an undoubted fact, however, that about 50 years after, in the time of Cyprian, children as soon as born were allowed to be baptized by the council of Carthage. But what is still more to the point, the scriptures inform us, that children were introduced into the church of God by circumcision, from the time of Abraham till the advent of Christ; and as baptism came in the room of circumcision, children ought still to be introduced in the same manner as before. That baptism came in the room of circumcision, will appear from the reasoning of Paul. It is admitted that our Lord's supper was instituted instead of the passover, because that apostle says, That Christ our passover is sacrificed for us, and therefore we ought to keep the feast. But when the same apostle says, That we are circumcised with the circumcision made without hands, buried with Christ in baptism; we have the same reason to conclude that baptism was instituted instead of circumcision. It ought to be remarked, however, that it was instituted, not instead of that circumcision which was appointed at mount Sinai, and which composed part of the law of ceremonies belonging to the covenant of works made there; but instead of that circumcision which was instituted 430 years before, Gal. iii. 17. when God commanded Abraham to leave his country, and which, as Paul expressly declares, belonged to the covenant of redemption. This circumcision, therefore, and the baptism of Christ, were initiatory rites of the same covenant at different periods. But the change in the initiatory rite made no change in the subjects of the covenant. This, then, accounts for the silence of scripture respecting infant baptism. Children were introduced into the church of God in the days of Abraham, at the coming of Christ, and at the present day. When things are to remain unaltered, a command for them to do so, would not only be superfluous, it would be foolish. But when a change is to take place, a command, or, at least, a precedent to authorise it, is absolutely necessary. Since, therefore, neither command nor precedent to this purpose is found in scripture, children ought not to be excluded from that covenant into which they undoubtedly were once admitted.

Before we leave this branch of the subject, we may remark, that as certain employments were thought, in ancient times, not only dishonourable, but unlawful, such persons as professed them were excluded from baptism. Of this description were magicians, image-makers, gladiators, stage players, public drivers, and even strolling beggars. We are sorry to add, that the generous maxim of our Saviour, "Whatsoever ye would that men should do to you, do ye even so to them," seems not to have been remembered by his followers, when they decreed, That the slaves of Christians should not be baptized without the approbation of their masters; but that the slaves of heathens, Jews, and heretics, should not only be baptized without the consent of their masters, but should, by baptism, obtain their freedom.

Sects that reject baptism.

It has been said, that soon after the apostolic age, many Christian sects rejected baptism. But the accounts of these sects are so obscure and contradictory, that no reliance can be placed upon them. It is probable this error was not so common as has been pretended. Perhaps the Valentinians embraced it. The Paulicians interpreted all that is said of baptism in an allegorical manner, and by the water understood the gospel. The Manichæans, however, did baptize; though the contrary has been generally believed. The Quakers, at the present day, reject baptism, and maintain, that it was appointed only for the Jews on account of their prejudices; or, at most, was to be observed only once, when Christianity was founding, to represent visibly the mystical purification of the soul. In support of this opinion they adduce, 1 Cor. i. 17. But the context clearly proves, that though Paul did not commonly baptize, it was not because it was unnecessary, for the persons to whom he was writing were baptized; but because that office was committed to others, to prevent the bad consequences which might have resulted from its being said that he baptized in his own name. They, likewise, adduce, Ephes. iv. 7, and maintain, that the one baptism, there mentioned, is that of the spirit. But the baptism of the spirit (an expression altogether figurative) was so far from superseding baptism by water, that, according to the express reasoning of Peter, Acts x. 44, it both gave a right to it, and implied the necessity of its being administered. The words of the institution, likewise, as well as the practice of the apostles, are sufficient to prove that baptism was appointed for both Jews and Gentiles. The opinion of some Socinians, likewise, deserves notice. From the manner in which Jewish proselytes were baptized, they maintain, that only converts from a different religion are proper subjects of baptism, and though the children which were born to them before conversion are to be baptized, yet such as are born afterwards are baptized in their parents. But the legitimate office of analogy is not to prove but to illustrate; and Jewish baptism was so different from the baptism of Christ, that no just conclusion can be drawn from it. The whole tenor of scripture, likewise, even of those parts which were written many years after Christianity was published, always represents believers as personally baptized. Many other arguments might be adduced, but they appear not necessary in this place.

Administration of baptism.

As the commission to baptize was given to the apostles, we conclude that none but the ministers of Christ have authority to baptize. But we are far from thinking, as some have done, that none but the successors of the apostles in office should administer this rite. Indeed, it would not be difficult to prove, that the apostles had really no successors. But if this should not be granted, we would ask, Was Philip, who baptized the Samaritan, an apostle? Was Ananias, who baptized Paul, an apostle? Certainly not. Others, therefore, besides apostles, had authority to baptize. As deaconnesses, also, were appointed by the apostles, it is certain that they, at a very early period, administered baptism to their own sex. Immediately after the apostles, bishops only, or such presbyters as were authorised by them, baptized.

Lay-baptism.

But in the 2d century, Tertullian informs us, laymen baptized in cases of necessity; though in a synod held at Elvira, in 306, this office was restricted to laymen who had not been married a second time. Persons thus baptized, if they survived, were afterwards to be confirmed by the bishop. When Augustin, however, in the 4th century, established the doctrine of original sin, it was supposed that all infants, dying unbaptized, were excluded from heaven. Hence, a licence to baptize was given to midwives; and this was soon extended to any person, whether Jew or Christian, righteous or wicked. The truth of history obliges us to add, that this doctrine was carried so far, that in difficult births water was commanded to be poured upon whatever part of the infant should appear, and when that could not be done, baptism was to be attempted, by means of a syringe, in a way that delicacy forbids us to explain. This practice is still authorised in the church of Rome. Even in England, the common prayer books of Edward and Elizabeth permitted lay-baptism in cases of necessity. In the Hampton-court conference, 1603, it was condemned with some difficulty. From that time it has bee accounted unlawful.

When Christianity was first established, conver were admitted to baptism without any respect to ti or place. But early in the 2d century, except cases of necessity, the celebration of this rite was co fined to the festivals of Easter and Whitsunti Baptisteries and fonts were erected in the 3d and 4 centuries. The novitiate of catechumens, which th universally prevailed, was productive of two bad c sequences; some converts, conscious of their imp fections, never imagined that they were sufficien prepared, and refused to dedicate themselves to G others, of which number was Constantine the Gr unwilling to forsake their sins, and imagining t baptism cancelled every violation of duty, postpo that ordinance to the end of life, that thus they mi be dismissed pure to heaven. In this situation thi remained till the Reformation. Even after the formation, the preface to the book of common pra published by authority in 1549, enjoins the admi tration of this rite, as far as can be done convenien only at Easter and Whitsuntide. Neither the formed, nor the Greek church, observe any partic period; but infants are commonly baptized by latter on the eighth or tenth day.

Almost all the ceremonies formerly mentioned still retained in the church of Rome. The Gr church observes nearly the same form, but employs mersion. Immersion, either single or trine, is ad ed in all the Oriental churches. The refor churches, in general, reject human inventions, observe sprinkling. The Baptists suppose imm sion and a personal profession of Christianity a lutely necessary to the validity of the deed. Bapt has sometimes been performed in wine when wa could not be obtained. In ancient times, the bapti of such as had committed public sins was often, by w of punishment, deferred till the end of life. The cient rubricks almost universally condemn priva baptism, except in cases of necessity, but gran dispensation to the children of kings and princ The giving a name to the child at baptism, thoug probably derived from the conduct of the Jews circumcision, is by no means to be considered as par of the rite. (N)

BAPTISTA Porta. See the *History of* Optic

BAPTISTERY, in its proper acceptation, a place where water is kept for the administratio of baptism. We are certain from Scripture, that when Christianity was first established, no particular place or edifice was appropriated to this ceremony. The river, the lake, or the pond, which was most convenient, was always chosen, and history is not without many instances of the performance of baptism in private houses. As this was the common practice in the time of Justin Martyr and Tertullian, we are sure baptisteries were not erected before the end of the second century. It is probable that, about the middle of the third century, edifices of this kind began to be founded in such towns and cities as were at a distance from fountains or streams. Yet it must not be denied, that where a fountain or stream could be obtained, the baptistery was erected over it; and where it could not, water was conveyed to the place by pipes, and in the same manner was discharged when found necessary. Hence the church to which the baptistery belonged was generally dedicated to John the Baptist, and received the name of St John *in fonte*, or, *ad fontes*, that is, the church near the fountain, or baptistery. Though the origin of baptisteries is unknown, yet we may hazard a conjecture that they were first erected in imitation of the Pool of Bethesda, and its porches or cloisters, famous in the history of our Saviour, to which they appear to have had some resemblance. But as the church was then exposed to poverty and persecution, and its members were generally in the lowest walks of life, baptisteries must have been mean and simple like the persons who employed them. When Christianity, however, was established in the Roman empire by Constantine the Great, the church aspired to opulence and grandeur; and, as external rites have too often superseded internal piety, and outward splendour compensated for moral virtue, the professors of Christianity, who were then the first men of the state, imagined that they would procure the pardon of sin, and conciliate the friendship of Heaven, by expending their superfluous wealth in building magnificent structures for religious worship. But though baptisteries could then boast of considerable elegance and splendour, yet they were, for many years, raised at a distance from the churches. The page of history informs us, that the first baptistery which was built adjoining to any church, was annexed to the cathedral of Rheims, for the baptism of Clovis king of France, who was converted by his queen Clotilda, and baptized by Remigius bishop of that place, in 496. Though there were many churches in one city, yet for the most part there was but one baptistery, which was generally annexed to the principal church. It is a curious fact, in the history of superstitious usurpation, that the church to which the baptistery belonged, claimed, from that circumstance, a superiority over the rest, and employed it as a foundation on which to rear the antichristian fabric of spiritual dominion. In succeeding ages, the bishop of the baptismal church granted, in the plenitude of his power, licences to other churches to erect baptisteries; but still reserved to himself that superiority over them which he had formerly usurped. But as the ceremonies with which baptism was then celebrated, were attended with some little expense, a provision for that purpose became necessary. Hence baptisteries became, not only engines of power, but sources of wealth. This was more particularly the case after donations for religious purposes began to be considered as expiatory for sin. Then the hopes and the fears of superstitious minds prompted them at first to endow baptisteries with milk, honey, wine, oils, and salts. To these followed cups, vases, &c. which, being marked with the initial letters of John the Baptist's name, gave rise, perhaps, to baptismal inscriptions. Habits for the priests, and money for the support of the poor, and of those persons who were employed in instructing catechumens, and officiating at the baptistery, were added. Pictures, and other ornaments for embellishing the edifices, were also given: but though these, in general, had some reference to John the Baptist, or to the ceremony of baptism itself, yet their evident tendency was to foster pride, to strengthen superstition, to subvert the foundation of virtue, and deaden the spirit of religion.

From a survey of the famous edifices of this kind which still remain, we find that a baptistery was an octagonal structure, with an arched roof like a dome. In the Lateran baptistery at Rome, which is the most ancient in that city, the cupola is supported by eight pillars, and between them and the wall there is a piazza or broad walk quite round. The porch or vestibule of the baptistery was sometimes also supported by two pillars; and in this the confession, exorcism, and unction of the catechumens took place. To the outside of the walls of some baptisteries small buildings were added, in the form of cloisters; and the whole circumference, in the inner sides of the walls, was divided into a number of apartments, which were employed as vestries, oratories, and schoolrooms. The middle of the building was a large hall, where the priests, the catechumens, and the spectators assembled when baptism was to be administered; and in the centre of this hall was an octagonal bath, which, properly speaking, was the baptistery, and into which the persons to be baptized descended by steps. As the catechumens were often naked when baptized, decency required that the men and the women should be separated. For this purpose many baptisteries had more than one bath, and sometimes water was conveyed into the side-rooms. The inside of the roof was frequently ornamented with the most beautiful Mosaic work. This is particularly the case with the celebrated baptistery at Ravenna. In the centre is an emblematic representation of the baptism of our Saviour, and on the sides are the twelve apostles in long habits with their names, and many other figures, all of the most exquisite workmanship. Baptisteries were taken into churches in the sixth century, and continued to be used in the time of Charlemagne.

Some time after baptisteries were built, fonts were erected in them for the baptism of infants. These were small baths raised on platforms, to which the administrators ascended by steps, and in which they could immerse children without going into the water themselves. When immersion was superseded by sprinkling, a bason of water was placed in the font, and from it the ceremony was performed. Many fonts still remain both in England and on the continent;

and are beautifully ornamented with various figures relative to the baptism of our Saviour, and to the ceremonies which were annexed to baptism in the dark ages. Some of these fonts were moveable: amongst which may be mentioned the silver one which was kept at Canterbury, and which was generally brought from thence to the place where any child of the royal family was to be baptized. It was hung round on the outside with cloth of gold, and lined on the inside with cloth of linen, puckered and folded, to prevent the child being bruised. The whole was covered with a canopy of rich damask, bordered with fringe or cloth of gold, and above the bason, or font, was a gold or silver dove, to represent the Holy Spirit. See Justini Mart. *Apol.* 2. Tertulliani *de Baptissimo.* Joan. Ciampini *Vet. Monimenta*, cap. xxv. Du Cangii, *Glossar. in verb.* Baptisterium. Paciandius. Muratori, *Antiq. Ital.* Bingham's *Antiq.* book viii. Robinson's *History of Baptism.* (N.)

BAPTISTS, are a sect of Christians who derived their name from the peculiar opinions which they held respecting baptism, and began, about the time of the Reformation, to claim the attention of the ecclesiastical historian. When we take a superficial view of this sect, collected as it were into one society, and in its present embodied form, nothing appears more easy than to write its history, and to specify the doctrines which are peculiar to it. But when we come to examine it more minutely, and endeavour to analyse it into its elementary parts, we find that it is composed of very different materials, that its origin is hid in the darkness of antiquity, and that its history, for many centuries, is only the history of individual persons. If opposition to the mode in which baptism is commonly administered be the distinguishing characteristic of this sect, Tertullian, who lived about the end of the second century, may be accounted one of its earliest founders. A short time afterwards, Agrippinus, a Carthaginian bishop, and many of the neighbouring clergy, rejected the baptisms which were then administered, and re-baptized all those who joined this society. Cyprian and his followers adopted the same sentiments in the third century. From Carthage these opinions migrated to the East, and Firmilian, bishop of Cæsaria, and many other bishops in Asia, re-baptized. The Novatians and Donatists likewise condemned baptism as then commonly administered, and embraced the sentiments of those who re-baptized. The ostensible reason which all these persons assigned for this conduct, was the wickedness of those who were universally admitted to baptism, and which, in their opinion, rendered the ordinance altogether invalid.

But soon a different cause impelled the professors of Christianity to the same line of conduct. In the council of Nice, held in the year 325, it was decreed, that as the Paulianists denied the doctrine of the Trinity, and consequently omitted the names of the Son and of the Spirit in the administration of baptism, their baptism was nugatory; and hence all that joined the orthodox from that sect were re-baptized. The Arians, on the other hand, rejected the baptism of the orthodox, because it implied an acknowledgment of the divinity of the Son, and of the personality of the Spirit, and therefore they re-baptized all those who came over to them from the orthodox. It is a very curious fact, therefore, that at that time the whole church, though for very different reasons, might be accounted baptists, and esteemed re-baptization necessary for preserving the purity of the church.

But in the twelfth century several denominations of Christians arose, who, from the peculiar tenets which they adopted, pursued the same line of conduct respecting baptism. The Waldenses and Albigenses at that period, as well as the Wickliffites in the fourteenth century, inveighed bitterly against the immorality of the clergy, accounted baptism invalid when performed by a priest whose conduct was unworthy of the Christian character, and re-baptised all those to whom that ceremony had been administered by men who were openly profane. Socinus and his followers, who lived about the time of the Reformation, as well as the baptist churches in Holland and Germany at the present day, imagine that a personal profession of Christianity is essential to baptism, and hence they re-baptize all those who were baptized in infancy. The Greek church maintains tha[illegible] immersion is absolutely necessary to the validity o[illegible] the deed, and for this reason they re-baptize all thos[illegible] to whom baptism had been administered by sprinkling. The baptists of Britain, Poland, Lithuania[illegible] Transylvania, and America, all agree, that immersio[illegible] and a personal profession of faith and repentanc[illegible], constitute the very essence of baptism; hence the[illegible] re-baptize all who have been baptized in infancy [illegible]n any manner, or by sprinkling, when they have a[illegible]rived at manhood.

But though there were many individuals, and ev[illegible]n some small societies, who maintained the opinions, a[illegible]d deserved the appellation of baptists before the Ref[illegible]rmation, yet it was only about that period that t[illegible]e insulated members were collected into one bo[illegible]y, were properly organized, and attracted the attenti[illegible]on of Europe. As many of the nations, who h[illegible]ad groaned for ages under the superstition and tyran[illegible]y of the see of Rome, began then to break their f[illegible]etters, to assert their independence, and to rise to t[illegible]he dignity of men and Christians, the baptists imagi[illegible]ed that the glorious period was come, when their o[illegible]pinions would universally prevail, and the perso[illegible]nal reign of Christ would commence upon the ear[illegible]h. Giddy and intoxicated with liberty, for which t[illegible]ey had long sighed in secret, but to which they h[illegible]ad never before been accustomed; and animated and [illegible]directed by passion and imagination rather than by r[illegible]a-son and the word of God, they surrendered their u[illegible]nderstandings to all the wildness of enthusiasm, a[illegible]nd hurried into those scenes of indecency, of rapine, a[illegible]nd of bloodshed, which in the year 1533 alarmed t[illegible]he states of Germany, desolated the city of Munst[illegible]er, and disgraced the character of the whole party. ([illegible]ee ANABAPTISTS.) But though the odium of abs[illegible]urdity and wickedness has been indiscriminately thro[illegible]wn upon the whole party, yet it is as ungenerous as u[illegible]njust to affirm, that all the baptists approved, far l[illegible]ess followed, the standard of Matthias or Boccold. N[illegible]o sooner, therefore, had the arm of power inflicted up[illegible]on the leaders of the insurgents that punishment whi[illegible]ch their crimes merited, and struck with terror such [illegible]as

have been tempted to imitate their example,
ıe sect appeared to return to reason and to
n sense. This happy change was principally
l by Menno Simon, a man who, from being a
priest of the most infamous character, became
st teacher, equally distinguished for the mild-
d humanity of his disposition, as for the pu-
l rectitude of his conduct. By his prudent
s and unwearied diligence, were their socie-
uced to form, their discipline established, their
es defined, and a spirit of union and of mode-
nfused into the whole mass. The obligations
they owed to their amiable and disinterested
nspired them with the warmest gratitude, and
erence which they paid to him bestowed upon
ıe appellation of Mennonites, which they still
Their situation, however, was still far from
ıgreeable. Unacknowledged by any of the
of Europe, and dreaded from the remem-
of their late fanaticism, they owed their secu-
the generosity of the rulers, and not to the
ion of the laws; and the imprudence of a few
r own members, as well as the interest, the
, or the bigotry of the magistrate, might at
ave overwhelmed them with all the evils of
tion. It was to William prince of Orange, a
lustrious in the annals of civil and religious li-
that they were indebted for the first legal to-
which they enjoyed. His son Maurice imi-
is generous and enlightened example; but the
e of their protection was not only confined
the boundaries of their dominions, but was
feated, within that narrow circle, by the op-
of many to whom the subordinate offices of
overnment was committed. We may add, that
land, in 1538, some of this sect were burnt in
eld, and even in the seventeenth century they
ot exempted from the storm of persecution
was raised against the reformed churches.
re, however, now protected in Britain, by the
oleration, 1689; and they enjoy equal secu-
nany other nations of Europe.

ıst have already occurred to our readers, that
ptists are the same sect of Christians which
ıerly described under the appellation of Ana-
rs. It is but justice to acknowledge, that they
ıe latter appellation with disdain; and main-
ıat as none of the forms adopted by other
s are consonant to scripture, the baptism of
ıurches is in reality no baptism. Hence, in
inion, they do not *re*-baptize. Indeed, this
have been their great leading principle from
of Tertullian to the present day. Accord-
hem, something essential to baptism, either
bjects, or in the administrators, or in the mode,
tted, which rendered the rite altogether nu-
and hence they asserted, that their baptism
first that was administered to such as were
ubjects of it.

gh the Calvinistic and Arminian baptists are
ıe most numerous at the present day, yet there
baptists who adhere to the dogmata of Arius,
s, and Socinus. Hence it is, that this sect may
o be divided into a number of lesser sects, each
ished by its own name, and by its particular
opinions. To specify all these would be inconsistent with our plan. We may, however, be allowed to remark, that the following opinions, though not adopted by the whole body of baptists, have yet pretty generally prevailed. 1. That our Saviour's body was not derived from the substance of his mother, but was created in her womb by the Holy Spirit. 2. That during the Millenium, Christ will personally reign over his church on earth. 3. That private Christians have authority to preach the gospel. 4. That the gospel supersedes all those civil institutions which men have established for the support and regulation of society. 5. That true Christians ought not to exercise the offices of magistracy. 6. That war, even in self-defence, is unlawful. 7. That no Christian should confirm his testimony by an oath. 8. That the Sabbath was not changed from the seventh to the first day of the week. 9. That a community of goods was established by the gospel. And, 10. That Christians, in imitation of their Lord, ought to wash the feet of their guests. But the opinions which are acknowledged by all the baptists, and which may be accounted characteristic of the sect, are, 1. That the church of Christ upon earth is an assembly of real saints, and must be kept pure from the wicked. 2. That no man is born a member of any particular church, but must voluntarily choose for himself. 3. That baptism ought only to be administered to adults, upon a public profession of faith and repentance, by immersion. 4. That civil rulers have no authority to enact laws, or to enforce obedience in matters of religion. 5. That the ministers of religion have no power over the opinions or consciences of their hearers, but are to be accounted mere teachers. And, 6. That the religious establishment and form of worship, in Christian churches, ought to be congregational or independent. See Tertulliani *de Baptismo*. Cypriani *Epistolæ*. Optati *Op.* lib. ii. Baronii *Annales An.* 321. Albaspinaci *Observat. in Optat.* Labbei *Concil.* tom. ii. can. 8, 19. Binii *Notæ in Conc. Nicen.* Bossuet, *Histoire des Variations des Eglises Protestantes.* Hermanni Schyn, M. D. *Historia Christianorum.* Jo. Henrici Ottii. *Annales. Anabapt.* Mosheim's *Church Hist.* Robertson's *Charles V.* Robinson's *Hist. of Baptism.* (N)

BAR sur Ornain, formerly Bar le Duc, is the chief town of the department of the Meuse, in France. The articles of the commerce of this town, are hemp, wood, and wine. The hemp is very abundant, and is employed in the fabrication of coarse linens. The wood consists of planks of oak, and deal boards. The Marne, into which the river Ornain discharges itself, facilitates the intercourse between this town and Paris. Bar sur Ornain is celebrated for its confectionaries of fruit, and its wines are reckoned equal to those of Champagne. All kinds of steel goods are manufactured in the suburbs. Population 6961. East Long. 5° 11′, North Lat. 48° 46′ 5″. (*o*)

BARABA, a steppe or extensive plain on the western verge of Siberia, situated between the rivers Irtish and Oby. This steppe exceeds 600 versts in length from north to south, and 400 in breadth from east to west. The whole of this extensive region is a continued flat, diversified only by forests of birch-wood, and by lakes, both of salt water, and of fresh. The soil and the climate are extremely favourable to agriculture. Some of the lands indeed are very low and marshy, but in general they are either covered with fine herbage, or with luxuriant crops of grain. The southern part of this plain, towards the Irtish and the mountains of Altay, is by far the driest, but it is likewise the most barren, and the least adorned with wood. Deep forests spread over the north, and overshadow the lower banks of the Oby. From the general appearance of the steppe of Baraba, naturalists have concluded that it must once have been completely covered with water, and afterwards have contained a much greater number of morasses and lakes than at present. The present inhabitants, indeed, affirm, that even within the memory of some of their old men, the acquisitions made by the firm land, in consequence of the diminution of the lakes, and the drying up of pools, reedplots, and marshes, has been very observable. No country in Siberia abounds more in water game of every description than the plain of Baraba. Its lakes swarm with pike, perch, and other species of fish; and their surface is covered with fowls, whose beautiful plumage yields a very lucrative branch of commerce.

The people who occupy this steppe are called by the Russians Barabinzes, or Barabinzians; and, from the diversity of their features, appear to be descended from several different tribes. They had been successively conquered by the Kirghises and Soongares; and when Siberia was subdued by the Russians, their numbers were very small, and they were so stupified by oppression, that they could relate no particulars whatever of their history. The greater part of them appear from their physiognomy to be of Tartar origin; the long, half-opened eyes of others of them, evidently indicate their descent from the Mongoles; while the Kalmuc countenances of a third part of them bespeak their affinity with the Soongares, their former conquerors. The vapours constantly exhaled from their lakes and marshes, render their atmosphere so gross as even to affect the complexions of these people, who are in general very sallow; while the same cause imparts to their minds more than Dutch indifference, and more than Bœotian dulness. Agitated by no strong passions, they are almost free from vice, and never guilty of any flagrant crime. Disgraced neither by intemperance, dishonesty, nor violence, they might be regarded as one of the most amiable nations on earth, did not their torpid apathy remind us, that they are not vitious only because they have no temptation, and were they not degraded by their stupidity almost to the level of brutes. Till the conquest of their country by the Russians, they derived scarcely any advantage from the fertility of their lands. Scanty herds of cattle and of horses constituted all their wealth; and fish and wild fowl were their principal food. There are now several colonies of Russians established among them, who rear rich crops of grain, have established some lucrative branches of trade, and may in time improve not only the appearance and resources of the country, but also the manners and mental character of the simple, but rude, natives. Every village in the Baraba is under the direction of a chief, and every district is governed by a sort of prince, called a yaouta. The only advantage connected with this elevation, i the respect and seeming obedience which it commands. The Barabinzians were conquered by the Russians in the year 1595; yet even after that tim were often harassed by the incursions of the Kir ghises and Soongares; the latter of whom compelled them to pay an annual tribute. Since the Siberian frontier line was properly defined, they hav enjoyed complete tranquillity under the protection o the Russians. They number about 5000 bows. Mos of them have abjured Paganism, and embraced th religion of Mahomet. See *Voyages de Pallas*, octavo, tom. vi. p. 436, &c. Tooke's *View of the Russian Empire*, vol. i. p. 180; vol. ii. p. 64. (μ)

BARBADOES, the most windward of the We India islands, and one of the principal of those belonging to Great Britain. It is supposed to hav been first discovered by the Portuguese, in the cours of their voyages from Brazil, and was then totall uninhabited. They did not make any settlement o this island, but having furnished it with a breed o hogs, for the benefit of such of their countrymen a might navigate the same tract, they left it in the situation in which they found it. The first of the English who are known to have visited Barbadoes, wer the crew of a ship from London to Surinam in 160 Finding it without inhabitants, they took possessio of the country by fixing a cross on the spot wher James Tower was afterwards built, and they put o it the following inscription: "James, king of England and this island." The English did not, however, form any settlement in Barbadoes until 162 when a few adventurers, under the patronage of th earl of Marlborough, to whom James I. had made grant of the island, arrived upon it, and laid the foundations of the tower, which still retains the name o that prince. The claims of this nobleman, howeve were disputed by the earl of Carlisle, who received general grant of all the Carribean islands fro Charles I. After some time, the latter noblem became the sole proprietor of the island; but in 166 the family gave up the patent, on condition of receiving a permanent and irrevocable grant of 4½ per cent. on the produce of the island exported to oth parts of the world; a burden which, according to th agreement, still falls upon the colonists. The planters, though they felt the disadvantage of the proprietary government, were driven into this measur by the crown. The conduct of the Lord Chancello Clarendon, in promoting it, was afterwards though so justly reprehensible, as to form one of the articl of impeachment brought against him by the Hous of Commons in 1667.

This island, according to Mr Edwards, is abou 21 miles in length, and 14 in breadth, and contain 106,470 acres, most of which are in a state of cultivation. The soil near Bridgetown, and in the lo parts of the country, is formed of a rich black earth spread on a base of calcareous rock, formed of madripores and other marine concretions. In some districts the soil is of a red earth, of greater depth, bu inferior in richness; in others it is of a light whitis earth, broken into a grey mould, or hardened into lump resembling chalk, but actually consisting of indurate

ched by exposure to the weather. Of
of soil, the black mould is best suited for
on of the cane, and with the aid of ma-
orded as great returns of sugar, in fa-
sons, as any in the West Indies, the prime
Kitts excepted. As this island has been
cultivation, the soil is supposed to be now
usted. In order therefore to supply it
e, we find that great herds of a species of
chiefly steers, are kept on the plantation
for this purpose. These are employed
orses, in the heavy labours of the estate;
mmon to see from twelve to twenty-four
a waggon, drawing a single hogshead of
me other small load, which in this coun-
e conveyed with facility by two horses
In consequence of such numbers of cat-
ecessary to furnish manure for the land,
greater supply of beef and veal in their
d fresh provisions are more abundant on
han in most of the other colonies. The
ording to Dr Pinckard, are brought alive
ket, to be killed after the different joints
d it often happens that the meat is slaugh-
ed for dinner, brought to table, and used
ts without growing cold.

uence of the general cultivation of this
its full exposure to the trade winds, the
of Barbadoes is more equal, and the air
ous than in most other parts of the West
leed it is considered as the most healthy
ands, so that it is common in sickness to
ge from the other colonies to Barbadoes,
ntpelier of this quarter of the globe.
inckard was in this country, the thermo-
d in the shade in the harbour was seldom
84°, and at no time did it exceed 86 de-
though this island is blessed with exemp-
cessive heat, from noxious vapours, and
l sickness, it is visited by a malady so
n, as to have obtained the appellation of
oes disease. It appears in the form of
, or what is here termed the glandular
is a peculiarly unsightly and distressful

d, after the settlement of the English upon it, appears to have rapidly attained a most flourishing state. We are assured that about the year 1670, there were nearly 50,000 whites, and 100,000 blacks on this small spot, being upwards of five hundred to every square mile, a population superior even to that of Holland or China. About this time, the trade of Barbadoes is said to have employed 400 sail of ships, which conveyed about 60,000 tons. The annual exports in sugar, indigo, ginger, cotton, and citron water, amounted to upwards of £350,000, and the circulating cash at home was about £200,000. But though this account is probably much exaggerated, it cannot be doubted that the population of Barbadoes has rapidly decreased after that time, as appears from the following returns which were made of the inhabitants at different periods during the last century:

Barbadoes.

	Whites.	Blacks.
1724	18,295	——
1753	——	69,870
1786	16,167	62,953

Among the inhabitants of this island, there is a numerous class between the great planters and the people of colour; a circumstance which forms a striking difference between Barbadoes and the other colonies. Of them many are descended from the original settlers, and have no precise knowledge when their ancestors first arrived. They accordingly regard this island as their nation and only abode, and do not, like the planters or the negroes, look back to the scenes of infancy as their better home.

We are informed by Mr Edwards, that the annual produce of this island had decreased during the last century, in a much greater proportion than in any of the other islands: but previous to the war with France, the planters appear to have extended the cultivation of sugar, in consequence probably of the advances upon that article in Europe. In 1736 the crop of sugar amounted to 19,800 hogsheads, of 15 cwt.: but after this period, it fell to nearly one half of this quantity, and did not begin to increase until about the period of the French revolution, as appears from the following account of the principal exports from this island at different periods:

SUGAR.			MOLASSES.		RUM.			GINGER.	ALOES.			COTTON.	
ls.	Trces.	Bar.	Hds.	Trces.	Hds.	Trces.	Bar.	Bags & Barrels.	Hds.	Trces.	Gourds.	Bags.	lbs.
948	0	0	60	0	0	0	0	4667	0	0	327	600	
659	82	3419	114	0	5199	39	693	8070	1	0	409	8,864	
929	183	2415	87	37	3872	27	614	6095	1	1	688	10,511	
309	63	3674	0	0	3386	0	607	5364	0	0	303		1,894,365
021	96	4520	0	0	3172	0	397	5180	0	0	372		1,327,840
998	123	2935	0	0	2331	0	261	4565	0	0	475		1,287,088
333	60	2346	30	0	3008	0	411	3735	0	0	770		1,163,157
073	125	2698	188	0	5064	0	512	3046	0	0	515		974,178

Barbadoes.

The following is an account of the shipping employed in the export of these and other articles, during the year 1787, and of the value of the cargoes, according to the actual prices in London, as made out by the inspector general of Great Britain.

Country.	Shipping.			Total Value.		
	No.	Tons.	Men.	£.	s.	d.
To Great Britain, ...	66	11,221	833	486,570	4	8
Ireland, ...	3	317	28	11,521	15	10
United States, ...	54	6,416	379	23,217	13	4
British America, ...	41	3,182	237	18,080	6	0
Foreign West Indies, ...	78	5,694	458	207	0	0
Africa, ...	1	87	7	8	15	0
Total, ...	243	26,917	1,942	539,605	14	10

Table of the Articles imported into Barbadoes in the years 1804, 1805, *and* 1806.

	1804.				1805.				1806.		
Articles imported.	Great Britain.	British Colonies.	United States.	Other Countries.	Great Britain.	British Colonies.	United States.	Other Countries.	Great Britain.	British Colonies.	United States.
	Bushels.				Bushels.				Bushels.		
Corn	40,894	811	26,242	1,897	26,543	936	37,657	385	53,465	604	22,683
	Cwts.				Cwts.				Cwts.		
Bread, Flour and Meal	2,015	264	93,457	26	12,185	406	95,176	14	14,610	433	78,475
	Barrels.				Barrels.				Barrels.		
Rice	31	—	2,812	195	—	—	1,094	—	—	—	2,373
Beef & Pork	16,761	341	159	25	13,611	236	1,326	—	13,347	65	25
	Bar. Quint.	Quint.			Bar. Quint.				Bar. Quint.	Quint.	
Dry Fish .	0 13	16,050	0 3524	0 4600	0 55	324 5660	0 34	—	15 4	31,016	0 55
	Barrels.				Barrels.				Barrels.		
Pickled Fish	220	3,211	1,974	6	187	4,696	303	—	235	2,654	92
	Firkins.				Firkins.				Firkins.		
Butter . . .	15,035	—	775	—	11,249	65	10	—	14,931	76	74
	Number.				Number.					Number	
Cows & Oxen	1	7	1,369	—	1	—	1,499	—	—	2	1,464
Sheep & Hogs	—	—	98	—	—	—	130	—	—	—	152
		Feet.				Feet.				Feet.	
Oak & Pine Boards, & Timber	—	2,917	4,095,977	—	—	143,935	5,415,352	3,930	—	7000	5,205,07
Shingles . .	—	—	5,601,400	1,500	—	106,500	8,355,650	—	—	40,000	6,055,9
Staves . . .	—	796,641	834,994	45,000	—	31,080	923,928	18,000	—	22,196	1,022,5

The number of slaves imported into this island, from 1786 to 1792, amounted to 4481, so that at the latter period there were 64,330 upon the island. In 1792 the public taxes, exclusive of the duty of the 4½ per cent. on exports of native produce, amounted to £9443 : 19 : 3, which was nearly the average of them during the preceding six years.

According to a statement given by Mr Wilberforce in the House of Commons, in the course of the investigation of the slave trade, the number of slaves on this island was as follows:

In 1764 about 70,706
1774 . . . 74,874
1780 . . . 68,270
1781 . . . 63,248
1786 . . . 62,115

This island is divided into five districts, and eleven parishes, and contains four towns, namely, Bridgetown, Charlestown, St. James's, and Speight's town. Bridgetown, the capital, has one of the finest harbours in the West Indies, and before it was destroyed by the fire of 1766, consisted of about 1500 houses which were mostly built of brick. It had scarcely risen, however, from the ashes to which it was reduced, when it was torn from its foundation, and the whole country made a scene of desolation, by a dreadful storm in 1780, in which no less than 4326 of the inhabitants miserably perished, and the damage to the island was computed at £1,320,564 sterling. Bridgetown is the residence of the governor, whose annual salary was raised by Queen Anne, from £1200 to £2000, which is paid out of the exchequer, and charged to the account of the 4½ per cent. duty. The form of the government of this island resembles that of Jamaica, except that the council is composed of twelve members, and the assembly of twenty-two. The most important difference is with regard to the court of chancery, which in this island is composed of the governor and council, whereas in Jamaica the

r is sole chancellor. On the other hand, in
es the governor sits in council, even when
er are acting in a legislative capacity, which
ica would be considered as improper and un-
tional. It may also be observed, that the
f grand sessions, common pleas, and exche-
Barbadoes, are distinct from each other, and
united in one supreme court as in Jamaica.
es is situated in West Long. 57°, and North
10′. See Raynal's *History of the European*
nts in the East and West Indies, vol. v.
s' *History of the British Colonies in the*
dies, vol. i. Pinckard's *Notes on the West*
vol. i. and ii. Clarkson's *History of the Abo-*
the Slave Trade, vol. ii. p. 71. Poyer's
of Barbadoes. Ligon's *History of Barba-*
Hughes' *Natural History of Barbadoes.*
Letters from Canada, 1809, p. 379. Thow-
lect. Acad. Par. tom. iv. p. 79. (W. B.) (π)

Barbarossa.

BAROSSA, HORUC, who received his name
red colour of his beard, was the son of a
the island of Lesbos, and must have been
out the year 1474. Animated by a restless
erprising spirit, he forsook his father's trade
was little more than thirteen years of age;
ether with his two younger brothers Hayra-
Isaac, joined a crew of pirates. Distinguish-
self by his valour and activity, he soon ac-
he command of a small brigantine, which had
ted out by a merchant of Constantinople, to
gainst such nations, as were not in alliance
Porte. He steered directly to the coast of
, and was well received by the king of Tunis,
mitted him to put into any of his ports, upon
n of his paying a tenth of every prize; and
e subjects he was a very profitable guest,
the sale of his booty, and the prodigality of
v. He was so successful in his piratical ex-
, that in little more than the space of eight
e saw himself, with his brother Hayradin,
s second in command, at the head of twelve
and several smaller vessels, well manned with
nd Moors. "Together with their fame and
says Dr Robertson, "their ambitious views
and enlarged; and, while acting as corsairs,
pted the ideas, and acquired the talents, of
ors." They were particularly desirous of
an establishment in Barbary, on account of
venient situation of its harbours, which lay so
the greatest commercial states at that time in
dom; and they did not suffer to pass unim-
some favourable opportunities which occur-
accomplishing their object. Invited to assist
of Biyeyah in recovering his capital from
niards, they entered keenly into the expedi-
inst the city; but were repeatedly foiled in
empts, in one of which the left arm of Horuc
ried away by a cannon ball. In the mean
ingratiated himself so much with the inhabi-
Jigel, by supplying them with corn in a time
e, that they invested him with the title of
ltan, and assisted him in reducing the neigh-
mountaineers. While thus actively employ-
larging his territories and extending his fame,
ved an embassy from Eutemi king of Algiers, requesting his aid against the Spaniards. Pleased with the prospect, which was thus presented, of acquiring a more convenient and important station on the African coast, he dispatched his brother Hayradin to Algiers, with eighteen galleys and thirteen barks; and himself advanced by land, with 800 Turks, 3000 Jigelites, and 2000 moorish volunteers. He stopped at Sher-shel on his way, where another celebrated pirate, named Hassan, had established his power; and having perfidiously put him to death, he seized his ships, and compelled his adherents to join in the expedition to Algiers. Upon his arrival in that city, he was hailed by Eutemi and his subjects as their deliverer, lodged in the most splendid apartments of the palace, and treated with the highest marks of distinction. Inflamed with ambition, he soon aspired to the sovereignty of the country, which he had been invited to protect; and possessed of the power to accomplish his object, he was very little scrupulous as to the means. He secretly murdered the unsuspecting monarch, who had sought his assistance; compelled the Algerines to acknowledge him as their king; and established his authority by the most sanguinary proceedings. Selim the son of Eutemi, supported by the Spaniards, attempted to recover the throne of his father; but the Spanish fleet, which had come to his assistance with 10,000 troops on board, was dispersed by a storm, and the greater part of the ships wrecked upon the coast. The neighbouring Arab tribes, alarmed by the success, and irritated by the encroachments of Barbarossa, solicited Hamidel Abdes, king of Tenes, to assist them in expelling from Algiers such a formidable neighbour; and in hopes of acquiring the sovereignty of that country for himself, he boldly advanced to the contest with 10,000 Moors, and a crowd of Arab troops. But the intrepid Barbarossa, with 1500 musketeers, easily routed this numerous army, which was armed only with javelins and arrows; pursued Hamidel to the gates of his capital; and soon made himself sovereign of Tenes. Leaving his brother Isaac governor of that city, he marched into the country of Tremecen, at the request of the inhabitants, to assist them to expel their reigning prince Abuzijon, who had usurped the sovereignty from his nephew Abuchen-Mon. By means of his artillery, he was again victorious over an enemy superior in numbers; and the defeated prince having been put to death by his disaffected subjects, Barbarossa was invited to take possession of the kingdom. Having alienated his new subjects, however, in a very short time, by his oppressions and extortions, they began to form schemes for the restoration of Abuchen-Mon; and that prince, having taken refuge in the Spanish fort at Oran, had found means to interest the Emperor Charles V. in his cause. The Marquis of Gomarez, with 10,000 men, was commanded to reinstate Abuchen in his dominions; and being joined by Selim, the son of Eutemi, with a number of Moors and Arabs, they advanced to besiege Barbarossa in Tremecen. Obliged by the revolt of the inhabitants to retire to the citadel, he defended himself there with the greatest vigour, to the last extremity; but, his provisions beginning to fail, he made his escape by a subterraneous passage, and attempted to

retard the pursuit of his enemies by strewing his treasures in the way. Overtaken by the activity of the Spanish general about eight leagues from Tremecen, and overpowered by superior numbers, his Turks were cut in pieces to a man, and he himself was slain, while fighting with the most determined valour. Thus perished this noted corsair in the 44th year of his age, about four years after he had obtained the sovereignty of Jigel, two years after being acknowledged king of Algiers, and scarcely a twelvemonth after the acquisition of the kingdom of Tremecen. (*q*)

BARBAROSSA, HAYRADIN, upon receiving intelligence of the defeat and death of his brother Horuc, assembled the Turks together in Algiers, to consult as to the most proper measures of safety. Aware of the well-grounded aversion, which the Algerines had always entertained towards their government, and alarmed by the strength of the Spanish army in their neighbourhood, they proposed at first to embark their troops and their plunder, and entirely to abandon the city of Algiers. But the Spanish commander, instead of pursuing his victory, having withdrawn the greater part of his forces from Africa, Barbarossa's adventurers were encouraged to keep their station, and he was instantly proclaimed king of Algiers, and high admiral of the sea. Perceiving, however, the growing impatience of the Arabs under his government, and having discovered symptoms of immediate insurrection, he put his dominions under the protection of the Grand Signior, received the title of viceroy or bashaw of Algiers, and was furnished with ample means of defence against all his enemies. He applied himself with the utmost vigour to fortify his capital, to improve his harbour, and to increase his navy. He reduced the Spanish fortresses in his neighbourhood, overawed the adjoining Arab tribes, and carried on the most daring depredations against all the maritime powers of Europe. At length A. D. 1533, partly as a reward for his great services, partly from jealousy of his growing power, and partly on account of his eminent talents as a naval commander, Solyman I. called him from the government of Algiers, and placed him at the head of the Turkish marine, as the only person in his dominions capable of opposing the celebrated Andrew Doria, the admiral of Charles V., and the greatest sea officer of his age. "Proud of this distinction," says Dr Robertson, "Barbarossa repaired to Constantinople; and, with a wonderful versatility of mind, mingling the arts of a courtier with the boldness of a corsair, gained the entire confidence both of the Sultan and his Vizier." He was accompanied to the Ottoman court by Alraschid, prince of Tunis, who had solicited his support against his younger brother

Muley Hascen; and he communicate
treacherous plan which he had form
Tunis to the Turkish empire, by usin
influence of the exiled prince. Al
up in the seraglio, and never heard of
rossa, who pretended to have him on b
sailed to Tunis with a fleet of 250 v
session of the place by means of the
rents; and then compelled the in
knowledge Solyman as their soverei
his viceroy. Having completely est
in his new kingdom, he renewed his
the Christian states to so great an e
such savage barbarity, that at len
Charles V. roused by the daily compl
rages, and moved by the entreaties of
ley Hascen, resolved to deliver Eu
scourge of his depredations, and pu
the head of a powerful fleet and arm
Tunis in the month of July 1535.
his part, was both prepared and det
a vigorous defence; but he was una
the deliberate courage and discipline
His strong fortress of the Goletta
sault after a desperate resistance;
feated in spite of all his exertions, wi
capital; the guns of the citadel we
him by the Christian captives, who
liberty during his absence; and he
difficulty by a precipitate flight
more detailed account of the proceedi
article ALGIERS.) Having returned
he was again appointed to command
lyman, and was employed in various
dertakings; in the war against the Vene
the invasion of Arabia Felix in 1538,
upon the islands of the Archipelago
he scoured the coast of Calabria wi
galleys; took and plundered the city
vanced to the mouth of the Tiber,
ror of the inhabitants of Rome and
country; sailed to join the French fl
and then directed his course to the
there repulsed with considerable lo
obliged to retire upon the approach
mies. After ravaging the coasts of
cany, he returned to Constantinople
continued to direct the naval affairs
empire till the year 1547, when he
[illegible] of sickness about the 80th year o
Robertson's *Hist. of Charles V.* vo
135. Mod. Univ. Hist. vol. xviii.
Mignot's *Hist. of the Ottoman Em*
[illegible] (*r*)

BARBARY.

[illegible]

R[illegible] the most northern division of Africa, is bounded on the north by the Mediterranean, [illegible] by Sahara or the Desert, on the east by Egypt, and on the west by the Atlantic Ocean. [illegible] from east to west from cape N[illegible] of Morocco to Alexandria on the confines of Egypt, [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] opposite extremes of drought and moisture, of heat and cold. In the coldest seasons the thermometer seldom sinks more than to the 5th degree above the freezing point, and in the warmest weather it seldom rises to sultry, except when the winds blow from the Sahara. During a long residence in Morocco, M. Chenier never observed it lower than $2\frac{1}{2}$ above the freezing point; and during the space of 12 years at Algiers, Dr Shaw found it so low as freezing only on two occasions, when the ground was covered with snow. According to the observations of the last mentioned author, all the variations of the atmosphere, as indicated by the barometer, are comprehended within the compass of $1\frac{1}{10}$ inch, or from $29\frac{1}{10}$ to $30\frac{4}{10}$. The air upon the coast is nearly as cool during summer, as in the most temperate countries of Europe; and, even in the more inland places, the heat is greatly moderated by refreshing breezes from the snowy summits of the Atlas mountains. In the southern provinces, however, during the months of July and August, the heats are sometimes extreme; and, about the beginning of September, a suffocating wind from the Sahara, called the Shume, or Siume, blows with the greatest violence for the space of one, two, or even three weeks. During the prevalence of this parching blast, the ground is often heated to such a degree, that it is almost impossible to walk upon it; and the inhabitants are obliged to retire to subterraneous apartments, or warehouses on the ground floor, eating nothing but fruits, and frequently sprinkling their houses with vinegar to cool the air. Buckets of water, also, are thrown upon the stone-walls of the bed-chambers, to render them habitable towards night; and so excessive is the heat, that the effect of this operation is often similar to that of casting water upon hot iron. During the dry season, from March to September, it scarcely ever rains; and the atmosphere is almost completely free of clouds: even during the rainy season, from September to March, there is seldom a day that the sun is not visible at intervals. These vernal and autumnal rains are remarkably regular, and seldom violent; but the country is occasionally subject to long-continued droughts, which never fail to produce innumerable swarms of locusts, the most destructive enemies of vegetation, and the frequent forerunners of famine.

Soil and culture.

The general appearance of the country is rather mountainous, tolerably covered with wood, but not so well watered. In many places it is finely varied in hill and dale; and amidst the forests and higher grounds, the most delightful retreats are to be found, refreshed with abundant and numerous streams, filled with odoriferous plants and flowers, and yielding the most luxuriant and nutritious herbage. The soil, especially towards the coast and in the mountainous districts, is light and sandy, of a very loose and yielding texture; but, in some of the northern provinces, it is composed of a rich black or red earth, without either clay or stone. It is capable of every kind of cultivation, and is productive in the highest degree. In the northern districts, it is well fitted for the growth of the most valuable European productions; and in the southern, it is capable of yielding every luxury peculiar to the East or West Indies. It is, in general, strongly impregnated with various salts; and to this circumstance, it is conjectured, may in great measure be ascribed that extraordinary fertilit for which it has always been remarkable. The culture which it receives, is meagre and superficial in the extreme The only manure, which is employed, is the annu burning of the long stubble, and the dung of the cattle turned out to pasture; while all the tillage that i bestowed is a slight scratching, about six inches deep which is frequently performed with a wooden plough and of which an ordinary pair of beeves is sufficien to accomplish a whole acre in one day. Two bushels and a half of wheat or barley are usually sow upon one acre; and the ordinary produce is about 1 bushels for one. A much greater increase, however is not uncommon. One grain generally puts fort ten or fifteen stalks, sometimes fifty or sixty, and i some instances even a still greater number. Each o these stalks sometimes bears two ears, and thes again often shoot out into a number of smaller one so as to afford a most extraordinary return. Afte the custom of the East, the natives of Barbary trea out their corn by driving the cattle over the sheave spread out on some level spot of ground, and the separate the chaff, by throwing it up against the win with a shovel. The grain is then lodged in matta mores, or subterraneous magazines, containing at leas 400 bushels each, lined with straw, and covered wit earth in a pyramidal form. In these store-places can be preserved, without suffering any damage, f the space of five or six years, and even for a muc longer period. The horticulture in Barbary is, possible, even more deficient than the husbandr and the gardens are neither laid out with taste, n kept with care; but present to the view a confu mixture of fruit-trees, pot-herbs, and grain, neith divided by walks, nor ornamented with flowers. Y even with this superficial cultivation, the soil of B bary yields almost every vegetable production in greatest abundance; and were the husbandman su ciently protected in the exercise of his labour, and enjoyment of his gains, it is supposed to be capa of producing a hundred fold more than the consu tion of its population requires.

The natural productions of this country are great variety and value, well suited to the want the natives, and amply sufficient to supply a large portation. The principal kinds of grain cultiva here are, wheat, barley, Indian corn, rice, millet, pe beans, caravances. No oats are to be found in B bary; and the usual provender of the cattle is bar and cut straw. Hemp, flax, cotton, and, in so districts, tobacco, are raised in considerable qua ties. Apples, pears, apricots, plumbs, pomegra cherries, dates, almonds, and all the fruits produ in the south of Portugal and Spain, are found in fertile country. Melons, oranges, lemons, limes, fi grapes, strawberries, and a multitude of similar freshing fruits, are supplied to the natives of north Africa, often indeed of an inferior quality, but nerally in the greatest profusion. The sugar c grows spontaneously in some places, stick liquo in amazing quantities, a variety of useful gums, different kinds of medicinal herbs, such as worms orris-root, coloquinth, &c. There are every wh along the coast, plantations of olive trees, which g to a considerable size; the argan tree, which bears a fruit resembling the walnut, yielding an excellent oil; large forests of oak, and corkwood; and a peculiar tree called arar or sandrac, (supposed to be the *arbor vitæ* of Theophrastus,) remarkable for its property of resisting the rot, and the worm. Honey and wax, also, though not strictly speaking vegetable substances, may here be mentioned, as forming no despicable part of Barbary produce.

ral. The prevailing mineral in this country is salt, which seems to pervade the whole soil, and of which there are innumerable pits, rocks, and springs. Salt-petre, also, is extracted in great quantities, from the earth of certain districts; and many sulphureous fountains, some temperately warm, and others intensely hot, are found in different parts of the country. There is very little stone of any kind fit for building; and though the Numidian marble is highly celebrated by the ancients, (*Plin.* l. 5. c. 3.) none of it has been observed in modern times. Several crystals and spars, specimens of talc, mica, and pyrites, and a great variety of petrefactions, have been noticed by travellers. There are mines of iron, lead, copper, silver, antimony, and a mixed ore of antimony lead and gold, in the mountainous districts; but only the three first mentioned metals are wrought to any great extent.

Barbary is richly stored with all the various classes of animated nature; and its domesticated animals have long constituted the most valuable possessions of the inhabitants.

The *horse*, formerly the distinguishing glory of Numidia, is now greatly degenerated. When the Arabs found, that the best of their stud were generally seized and carried off by their Turkish despots, they soon began to neglect the improvement of the breed; but those of West Barbary are still very much renowned for their fleetness and activity. They have, in general, a stronger sinew than the European horses; and, after a little training, become extremely manageable. They are taught to have only two paces, a walk and a gallop; to stop short suddenly, when checked at full speed; and to stand still, whenever the rider may choose to quit them. Except among the Shelluh tribes, the mares are kept for breeding, and the stallions only used for riding. The *ass* and *mule* of this country, though not equal in size and beauty to those of Spain, are very hardy and serviceable creatures, requiring little attendance, and generally employed both in riding and bearing burdens. The *kumrah* or *jumar*, a small animal, the offspring of the ass and the cow, has also been mentioned as a native of Barbary; and Dr Shaw has described one which he saw at Algiers, and which, he remarks, was not regarded there as an uncommon spectacle. But Mr Jackson, in all his travels in the west of Barbary, never saw such a creature, or found any person who had seen it, though he was informed that it was sometimes seen in Biledulgerid; and its existence is still considered by many naturalists as very questionable. The *cows* are small, and yield very little milk, seldom more than a quart at a time; but their flesh is tender and well tasted. *Sheep* are to be found in all parts of Barbary; and, owing to the abundance of aromatic herbs in the pasturage, the mutton possesses a peculiarly fine flavour. There is a species of this animal very common in the eastern districts, which have immense tails, containing a hard, solid fat, which is greatly esteemed by the natives, and which bears a near resemblance to marrow. On the confines of Sahara is another species, similar in shape and size to the fallow deer; but their flesh is dry, and their wool of a bad quality. The wool, indeed, of this country varies considerably; some of it is as coarse as hair, and some again as soft and fine as silk. The *goats* of Barbary are extremely prolific, and their exportation forms a considerable article of commerce; but they are chiefly valued on account of the leather, which is prepared from their skins. The *camel* is unquestionably the most useful animal in this quarter of the globe, on account of its well known capacity of enduring the utmost fatigue, and at the same time requiring a small proportion of nourishment. It can travel four or five days without water; can subsist for 24 hours upon one half gallon of barley and beans, or a few balls of flour; and can carry a load of seven or eight quintals, travelling 10 or 15 hours in the day, at the rate of 2½ miles in the hour. *Dromedaries* are more rare in Barbary than camels, and are generally brought from Guinea or Arabia. They are remarkable for the swiftness of their motion: and there is a particular species of this animal, which both Dr Shaw and Mr Jackson assure us, will go over more ground in one day than the fleetest horse can go in 8 or 10. It is called the *heirie* or *desert camel*; and of this extraordinary animal the last mentioned gentleman has given a most interesting description, to which we must refer our readers. We may merely inform them, that this creature is guided by a leathern thong, attached to a ring, put through its upper lip; that it can travel, on an emergency, seven days without water; that there are three kinds varying in excellence and value,—the telatayee, that is, performing in one day a journey which employs a horse three days, and one of these is equivalent to the price of 30 camels,—the sebayee, which travels seven days journey in one, and which are worth 100 camels,—and the tasayee, nine days journey in one, which are extremely rare, and which are worth 200 camels. The *desert horse*, called Sh'rubah Er'reeh, signifying *wind sucker*, (because the animal, when in speed, hangs out his tongue as if sucking the air,) bears the same relation to the common horse, that the desert camel does to the camel of burden. His body is slender like that of a greyhound, his legs small, and his chest very broad. He is used chiefly in hunting the ostrich; but is not so well calculated for crossing the desert, as he lives entirely on camels milk, and therefore needs to be accompanied by two she camels in such long excursions.

Among the *wild* quadrupeds of Barbary may be mentioned the large herds of horned cattle of the *neat* and *deer* species, which abound in the mountainous districts; and of which one of the most remarkable is the Fishtall or Lerwee, as it is called by Dr Shaw, or the *Aoudad*, according to Mr Jackson. It resembles a young heifer of about a year old; has a long mane or beard from the lower part of its neck; resides in the most inaccessible places; throws itself headlong over lofty precipices when pursued, generally falling on its horns or shoulders; is very seldom caught, and is not to be approached without great danger. The *rhinoceros*, whose horn is capable of receiving a very high polish, and is sold in Barbary at an enormous price. The young of this animal have only one horn, till a certain age; and, as one of its Arabic names is very similar in sound to the word which signifies a mare, it has been conjectured, that from this circumstance may have arisen, by mistake, the notion of the Unicorn. Among many other animals, not very well known in Europe, may be mentioned the elegant black-eyed *gazel*, or *antelope*, which is remarkably swift and timid; the *horreh*, a smaller kind of antelope, the emblem of cleanliness, as its name imports, celebrated for the brilliant whiteness of its belly, for the preference given to its skin, by the Moors of distinction, as the fittest substance upon which they can prostrate themselves in prayer, and for the concretion found in its testicle or stomach, called the bezoar stone, so much valued as an antidote against poison; the *thaleb*, or little red fox, which is very destructive to the young vines, and remarkable for its shrill and piercing cry; the *sibsib*, an intermediate species between the rat and squirrel, accounted by the Arabs a great delicacy, and the only animal which the Mahommedans torment with a view to improve the taste of its flesh; the *ape*, which is seen in great numbers, and found of a very large size in North Atlas; besides the deeb, or jackal, jerboa, porcupine, hare, rabbit, weasel, &c. Of the more ferocious wild animals, the chief are the *lion*, the *leopard*, the *panther*, which are all occasionally ravenous invaders of the Arab encampments, and sometimes even infest the roads, in the neighbourhood of large towns; the *wild boar*, whose strength is here proverbial, but which seldom attacks men, unless he be previously roused by some provocation; the *hyæna*, or *dubbah*, which, in Barbary, is more stupid than fierce, and whose flesh, as it is asserted by the Arabs, occasions a temporary stupefaction; the *wild cat*, which is large and strong, and, when pressed with hunger, will sometimes attack the traveller with great ferocity; the *bear*, or *dubb*, is very seldom seen, and inhabits only the upper regions of Atlas, which are continually covered with snow.

Birds.

Domestic *fowls*, *house-pigeons*, and *sparrows*, resembling those of Europe, are remarkably plentiful in Barbary. There is a great variety of the *duck* species, but the common *geese* and *turkeys* are seldom seen. The towns, in the summer season, are much frequented by *storks*, which are treated with great veneration by all Mussulmen, as being emblematical of conjugal affection, and also as being very destructive to many noxious reptiles. Among the wild fowl, may be mentioned, wood-pigeons, wild-geese, herons, bustards, flamingoes, pelicans, plovers; *partridges*, which are much larger and finer feathered than those of Europe; *curlews*, which are found in great abundance; *cuckoos*, which are esteemed a great delicacy by the Arabs; *wood-cock*, which, from the largeness of its head, is called by the natives, *the ass of the partridges*; *el hage*, a small cinereous-coloured bird, which lives upon insects of the beetle kind, which it sticks upon thorns, and does not eat till they begin to putrify: It has its name from the circumstance of its accompanying the caravans which go to Mecca. The *crow* of the desert is
a beautiful bird, somewhat larger than the
raven, with the legs and bill of a red colou
ostrich abounds in the confines of Sahara; a
which are taken near Cape Bojador are of th
size, and have the finest plumage of any in th
There are also various kinds of singing-bird
country, the lark, the nightingale, the thr
starling, the blackbird, and especially the *cap*
row, which is larger than the common sparr
coloured like the lark, which has a very sw
melodious note, superior to that of the cana
or of the nightingale, but which is so peculi
licate in its temperament, that it soon pines
the smallest change of climate. Among the
prey in North Africa, the most deserving o
are the *nesser*, or *vulture*, which, next to the
is the largest bird in that quarter of the glo
which feeds chiefly upon the horned beetle,
found upon the gum-ammoniac plant; and th
the largest species of which has an exceeding
and beautiful eye of an orange colour, an
bird, as the Africans believe, which engend
dragon upon the female hyæna.

On the coasts of Barbary is found the
abundance of excellent fish, particularly mulle
anchovies, sardines, herring, mackarel, cod,
soles, plaice, turbot, turtle. A very firm a
tasted *barbel*, *eels*, and *shebbel*, are very co
the rivers, the last mentioned of which is si
the salmon, and is extremely rich and delicat
mense quantities of it are salted or baked, a
into the interior of the country, where it is c
ed as an excellent corrective of the bad effect
times produced by an immoderate use of
Whales have occasionally been cast ashore o
parts, which are washed by the Atlantic, b
rarely on the coast of the Mediterranean;
these cases, considerable quantities of amber
generally found along with the stranded fish.
is not much shell fish on these coasts. S
prawns, crabs, and cray fish, indeed, are not
mon. *Oysters* also have been found near A
and the *muscles* there are both very excell
abundant. Land *tortoises* are of a good quali
of a very large size, sometimes weighing b
four and six cwt.; but the inhabitants do
them as food, and seldom catch them, excep
employed by Europeans for the purpose.

In the country of Barbary the insect tribes
tremely numerous, of a great variety of shap
remarkable brilliancy of colours. There are
flies, libellæ, and beetles, three inches in leng
four inches between the extremities of the
when extended. The most remarkable of th
species is the *dibben fashook*, which has a lo
proceeding from the upper part of its mout
which it perforates the ammoniac plant, and
the incisions from which the gum oozes out.
cicada or *cricket* is of a very large size, and
an incessant piercing noise during the night.
gnats, or *musquitos*, are extremely numerou
cially on the banks of lakes, and are very
their attacks upon Europeans; but the thic
of the Arabs, exposed daily to the scorching
the sun, are impenetrable to their bite. Bu

the insects of Barbary, the most formidable and abundant is the *locust*, which always come from the South, and often continues its visits for three, five, or seven years. When the swarms of these insects approach, they resemble an immense cloud darkening the sun; and when they settle on the ground to carry on their devastations, they are often crowded upon each other to the depth of several inches. They all advance in the same direction, climbing over every obstacle in their progress, clearing the ground of every vegetable substance, consuming even the bark of the trees, and announcing their approach, at a considerable distance, by the noise of their feeding. In order to give a new direction to their course, the inhabitants are accustomed to dig pits and trenches across their path, which they fill with water, or with combustible materials to be set on fire at their approach; but so immense are the numbers of these destroyers, and so eagerly do they press forward their ranks, that the trenches are soon filled, and the flames completely extinguished by the constant succession of new swarms. A few gardens in the neighbourhood of towns are sometimes preserved from their voracity, by means of a palisade of reeds, inclining towards a ditch on the outside, so that the locusts, being unable to climb up this slippery and sloping bulwark, fall back into the trench, and devour one another. They partially disappear during the rainy season; and are frequently carried away by hurricanes into the sea. During those periods of desolation, the locusts are very generally used as food, and are even esteemed a great delicacy; but the lower classes of people, by living entirely upon them, are said to become very meagre and indolent; and, whether from this circumstance, or from the pestilential smell of the dead locusts, or from some other cause, the visits of these destructive insects are frequently followed by the plague. *Scorpions*, resembling a small lobster, about three inches in length, abound in stony places, and old ruins; and often infest the cities so much, that, in order to guard against their attacks, the inhabitants are accustomed to place the feet of their bed-steads in tubs or pans of water: The sting of the yellow coloured is the most venomous; and the flesh of the animal itself, applied to the wound, is the most effectual cure. Of the various kinds of *serpents* found in Barbary, two only are highly poisonous; namely, the *buskah*, of a black colour, seven or eight feet long, with a small head, which expands to three or four times its usual size, when about to make its attack; and the *el ef fah*, or *dipsas*, about two feet in length, and of the thickness of a man's arm, beautifully spotted with yellow and brown. The *boah*, or desert snake, an enormous monster, from twenty to eighty feet long, and thick as the body of a man, is not indeed of a venomous nature; but the velocity of its motion, which it is almost impossible to escape, and the greatness of its strength, which is able to crush the bones of an ox in its grasp, render it sufficiently formidable to the traveller. There are also *domestic serpents* in this country, some of which are to be found in almost every house, and whose presence is considered as a benediction upon the family.

Inhabitants.

It is not possible to form a correct estimate of the population of Barbary; but it has been conjectured, that it is not above one-fifth of what the country could support. The inhabitants are a very mixed race; and may be distributed into different classes; such as Turks, Moors, Arabs, Berebbers, Shellichs, Negroes, Jews.

Turks.

Of these the least numerous are the Turks; but they are nevertheless to be considered as the sovereigns of North and East Barbary. They are in general a very abandoned race, the refuse of Turkey, chiefly composed of pirates and other banditti, who have either enlisted in the service of Algiers, Tunis, Tripoli, or who have fled from their country to escape the punishment of their crimes. "Yet these recruits," says Dr Shaw, "after they have been a little instructed by their fellow soldiers, and have got caps to their heads, shoes to their feet, and a pair of knives to their girdle, quickly begin to affect grandeur and majesty; expect to be saluted with the title of *effondi*, or *your grace;* and look upon the most considerable citizens as their slaves, and the consuls of the allied nations as their footmen." These Levant Turks generally intermarry with the native Moors; and their descendants, called Cologliss, or Coloris, form a very numerous class, active, and intelligent, but extremely turbulent and ambitious.

Moors.

The Moors, who may be considered as the descendants of those, who were driven out of Spain, reside chiefly in the towns and villages They have a sallow complexion, an aquiline nose, good teeth, black eyes, manly features, but frequently a very ferocious expression of countenance. Their limbs are clumsily shaped; their stature is commonly above the middle size; and their whole figure has rather a commanding appearance. They are naturally of a grave and pensive disposition, indolent to an extreme, and roused only by such violent passions as avarice and hatred. They have little curiosity or ambition after knowledge; and no spirit of enterprise, industry, or improvement. Their natural sagacity degenerates into duplicity, and they are guilty of the meanest acts of imposition; yet, with all their selfish cunning, they are often very improvident; and, with all their haughty appearances, they are capable of the most abject submission. They have been described by a very accurate observer, (who seems to have been sufficiently inclined to give as favourable a picture as possible), as ignorant and contemptuous of other nations, cruel and rapacious towards each other, living in continual suspicion and distrust, strangers to every social tie and affection, and scarcely susceptible of one tender impression; unparalleled in arrogance, insatiable in sensuality, and addicted to the most unnatural and degrading propensities. Some of the better educated among them, however, are courteous and affable in their manners, capable of much self-command in conversation, and slow in taking offence; but very noisy and implacable, when once they are irritated. They all possess one very noble trait of character in a most eminent degree, namely, fortitude under misfortune. Resigned in all things to the will of God, the Moor never despairs; no calamity or bodily suffering can make him complain;

but he waits in patient hope for an amelioration of his condition. The character of this people, in short, is a very inconsistent combination of the savage and civilized state; and may be attributed, in a great degree, to the united influence of their education, government, and religion.

Arabs.

The Arabs of Barbary are partly the descendants of those, who at first over-ran the country, under their Mahommedan leaders, and who have still kept themselves distinct from the other inhabitants; and partly emigrants from Sahara, who advance into the more northern districts, whenever the depopulations of the plague, or other calamities, afford admission to a new colony. They are divided into an infinite number of tribes, which never mingle by intermarriages, and which are almost continually at war with each other. If united among themselves, they would be more than a match for any of the Barbary states, to which they are tributary; and in order to keep them more easily in subjection, it is the practice of these states to encourage mutual acts of hostility among their Arab subjects. They live in tents; and generally form their encampments at a considerable distance from any town or village. Their occupation consists in taking care of their flocks and herds, and in raising a little wheat or barley. When the land, around their residence, has become less productive, and their cattle have consumed all the pasture; they strike their tents, and remove to a more fertile spot. They are generally obliged to procure permission, from the bashaw of the province, to settle in any particular place, in return for which indulgence they engage to pay a certain portion of their produce. The Arabs bear a great resemblance to the Moors, in their general character; but they are a more meagre, indigent race, frequently covered with rags and filth. Those among them, who live nearest the coast, are more hospitable and inoffensive; but it often requires blows to excite their respect, or to procure from them any accommodation. Those, again, who reside in the interior of the country, and especially on the borders of the desert, are lewd, cruel, and treacherous; habitual robbers, and cowardly assassins; who will indeed consider the person of a stranger as sacred, while he remains within their tent, but who will not scruple to murder their last night's guest, before he has well passed the bounds of their encampment.

Berebbers.

The Brebes, or Berebbers, inhabit the mountains of North Atlas; and are supposed to be the offspring of the original inhabitants of Barbary, who retired thither upon the conquest of their country, and who have still in a great measure preserved their independence. They are of a fairer complexion than the Arabs, of an active and industrious disposition, of a robust and athletic frame of body. In the higher grounds, they dwell in caves; but, in the valleys, they occupy tents, or huts of earth. They seldom change their place of residence; and employ themselves in cultivating the soil, tending cattle, rearing bees, and pursuing wild beasts. They are very intrepid hunters, dexterous marksmen, and capable of enduring the greatest fatigue. They entertain a strong dislike of the Moors and Arabs, whom they regard as usurpers; and, as many of their tribes are
extremely powerful, they pay or refuse tribut
cording to their own inclination. They have, in
gradually adopted the religion and customs o
Moors; but have still a distinct language of their
which is supposed to be a dialect of the old Ca
ginian. They are probably, however, a more an
people in Africa, than either the Romans or Cart
nians; and, from the circumstance of their livi
caves, it has been conjectured, that they may have f
ed a remote branch of the great nation of the Tr
dytes. Mr Bruce describes a very savage and inde
dent tribe called *Neardie* (perhaps the same, w
Abbe Poiret terms *Nades*, and of whom he gives
milar description), residing near Jebbel Aurez,
dwelling in huts of mud and straw. They occu
very rugged and inaccessible tract of country; an
great hazard of attacking them was expressed by
of their Maraboots by the strong figure of "e
fire." They have a fair complexion, red hair,
blue eyes. They have the figure of a Greek
marked with antimony on their foreheads; an
firm, that their ancestors were Christians.
seemed to rejoice more in that relation, than in
connection with the Moors; and Mr Bruce conc
them to be a remnant of the Vandals.

The Shelluhs inhabit the mountains of South
las, and are often confounded with the Berebl
but they are ascertained to be a distinct race, a
speak a different language. They live general
towns and villages, are chiefly employed in hu
dry, and are very simple and peaceful in their
ners. They are a very meagre people, and ren
ably abstemious in their diet; subsisting almost
tirely upon barley-bread and honey. Many fa
among them are supposed to be descended fron
Portuguese, who formerly occupied many of the
ports of West Barbary.

Negroes are very numerous in Barbary, espe
in the empire of Morocco, where about 30,00
them were embodied as troops, in the year 1780
the emperor Muley Ishmael. They are to be f
also in every part of the country, and almost in
family, in the state of slaves. Their condition,
ever, in this respect, is very different from th
their countrymen who are transported to the
India islands; and they experience a treatment
more humane, than the general character of
Moorish masters would warrant us to expect. S
times, indeed, they are kept, like a stock of c
to propagate for the supply of the market; b
general they are regarded as members of th
mily, into which they have been purchased; are
fully instructed in the principles of the Mahomm
faith; and usually obtain their freedom, after a
vitude of eight or ten years. The more intelli
among them are taught to read and write; an
soon as they are able to understand a chapter o
Koran, are immediately emancipated. These
rated negroes soon adopt the sentiments and ma
of the natives; and many of the most able of
and industrious cultivators are of this class.
are in general better formed than the Moors,
lively and active, but if possible more capriciou
blood-thirsty in their dispositions.

The Jews of Barbary, whose ancestors were

Portugal and Spain, are diffused over the
try ; and are found even in the mountains
exercising mechanical trades among the
They are subjected to every conceivable
ppression, and are frequently treated even
y than the beasts of burden. They are
ed to possess lands, to wear a sword, to
, or to leave the country without special
They are obliged to wear such a habit,
tinguish them at first sight; to address
ulman by the title of seedy or signor; and
heir sandals, whenever they approach any
ructure or consecrated place. They are
more severely and more undeservedly op-
r the whole country may be said to de-
their ingenuity and industry, and could
bsist without their aid. They are the only
ers, and have a share in all pecuniary and
transactions. They are employed even
the money of the different states, some-
n collecting the taxes; and seldom does a
mpt to carry on trade, without the assist-
Jewish agent. They are tolerated in the
of their religious worship; and, in towns,
nerally a particular quarter allotted for
nce, under the jurisdiction of an alcaide
y the government. They follow, in other
e customs of the Moors; and, under all
ssions, they find abundant resources in
uperior sagacity and information.

Christians, who reside in Barbary, are
visitants for purposes of trade, the consuls
n states, the slaves of Moorish corsairs,
ants of the Spanish settlements, and de-
n the Spanish garrisons. From a regard
pective nations, they may sometimes ex-
protection of the constituted authorities;
e Moors in general, they are held in as
mpt as the Jews; and are exposed to every
sult, that bigotry and brutality can devise.
gadoes, or foreigners, who have adopted
of the country, may be considered as
distinct class among the inhabitants of
The greater part of them are Jews, who
t, in apostacy, a refuge from their oppres-
rs are fugitive criminals, or men of despe-
s, from Spain; and a few are the younger
ropean crews, who have been shipwrecked
t. A renegado, upon his conversion, is
, clothed in a Moorish habit, and con-
ugh the streets on horseback accompa-
music and a great concourse of people.
hooses a Mahommedan name, and fixes
person, who adopts him as a child, and
rwards called his father; but who is not
as bound to take any farther notice of
re may be a few instances of persons of
tion having risen, by their abilities and
to situations of wealth and power; but,
their condition is exceedingly abject and
The native Moors avoid their society,
allow them to intermarry with their fa-
ey are at liberty only to connect them-
a negro, or the daughter of a renegado;
scendants are not acknowledged as genuine

Mahommedans till the fourth generation. They frequently find their situation so very deplorable, that they are ready to expose their lives to the greatest hazards, in order to make their escape from the country.

Civil government.

In all the states of Barbary, the government is of the most despotic description; and the inhabitants are subject to the most degrading oppressions. The supreme power is entirely without controul; and the lives and property of the natives are wholly at the disposal of their rulers. Every kind of cruelty and injustice is systematically practised; and it is even said to be a maxim of government in this unhappy country, that, "in order to rule the people effectually, there should always be a stream of blood flowing from the throne." The same principle of tyranny descends through the inferior classes of governors; and, provided they regularly remit to their superiors the required tribute, they are seldom called to account for their conduct. To be rich, is the greatest of all crimes in the eye of the Barbary princes; and such of their subjects, as have acquired property to any considerable amount, are very rarely permitted to enjoy it in peace. Their wealth is either openly extorted by the hand of power, or unjustly confiscated under the colour of law. The efforts of industry are thus completely paralysed; and the labours of the people are almost entirely confined to the supply of their immediate wants. Those, who are affluent, assume the appearance of indigence; and often, for still greatear security, deposit their riches in the bosom of the earth. The secret of this concealment, if not extracted by torture, frequently dies with the possessor; and the amount of hidden treasures in Barbary is supposed to be much greater than the quantity of coin which is in actual circulation. According to the laws of the Koran, indeed, the *forms* of order and justice are generally observed, but very little of the substance exists; and, in most cases, judgment may easily be purchased by money. Trials are very expeditiously conducted; and the person accused is not always heard in his own defence. Sentence is as expeditiously executed, as it is pronounced; and the condemned are not unfrequently hurried out of existence, without properly knowing for what offence they are made to suffer.

Punishments.

The punishments employed in this country are as severe, as they are summary; and are continually varying according to the fancy of the inhuman despots, by whom they are inflicted. Less heinous offences are punished by imprisonment and the bastinado, by cutting off the hands or feet, by tossing in the air so as to bruise the criminal by the fall: There are persons, who have learned by practice to inflict the last mentioned punishment so dexterously, as to be able, according to their instructions, to dash out the offender's brains, to dislocate his neck, to fracture his leg or arm, or to make him reach the ground without sustaining any material injury. In the case of capital offences, there are many barbarous methods of inflicting death upon the wretched criminal. He is knocked down with clubs, stabbed, or beheaded with swords, and sometimes literally cut to pieces; thrown in a bag into the sea, impaled on a stake, burned alive, suspended from iron hooks, tossed upon sharp pointed pikes, dragged at the heels of a mule, and sometimes actually sawn asunder.

Religion.

The religion of Barbary is the Mahommedan, of which it is unnecessary here to give a detailed account; but which, it may be observed, the Moors have greatly relaxed with respect to many of its precepts, and which, on the other hand, they have burdened with many additional superstitions. They secretly drink wine without scruple, and often to great excess; and easily satisfy their consciences by professing to take it as a medicine. In like manner, they render any prohibited food perfectly lawful, by merely ascribing to it some medicinal quality. They have the same ecclesiastical orders, acts of worship, festival seasons, &c. as other Mahommedans; but in addition to the public mosques, they have a great variety of private chapels consecrated to the devotion of individuals; and they surpass all the followers of Mahomet in the reverence which they testify to the different orders of saints. These are very numerous in Barbary, and of various descriptions; but they are known by the general name of Takeers or Maraboots,* and may be distributed into two principal classes. 1st, Those, who, by frequent ablutions, self-imposed austerities, strict observance of the Koran, and other acts of rigid devotion, have acquired the reputation of extraordinary piety. Of these, many are very sincere devotees, who make it their employment to visit the sick and to relieve the necessitous; but the greater part are artful hypocrites, who assume the appearance of sanctity merely to promote their influence with the multitude. Those are particularly called Maraboots, who lead a retired life like hermits, pretending to possess magical skill, to foretel future events, and to be endowed with miraculous powers. These generally preside at religious ceremonies, marriages, funerals, &c.; and employ themselves in selling different kinds of amulets or talismans to their deluded votaries. Under this class may be ranked those itinerant mountaineers, who pretend to be great favourites with Mahomet, and to have power over all venomous reptiles; and who go about the country entertaining the people by eating snakes, vomiting fire, and other juggling tricks. They are sometimes known to run about in a frantic manner, leaping, dancing, foaming at the mouth, and in these furious fits they often fall upon the first animal in their way, tear it to pieces with their teeth, and instantly devour it like beasts of prey; while the people are all the time anxiously soothing them with caresses, and using all possible means to quiet their frenzy.

Saints.

2d, The second class comprehends all idiots and madmen, who are considered by the Moors as under the special protection of heaven, and as moved by a divine impulse in every thing that they do. They are, therefore, treated with the highest veneration; carefully fed and clothed; and permitted, without restraint, to indulge in the most extravagant and immoral actions. Many of them are poor, imbecile, and inoffensive creatures, who find, in the superstition of their neighbours, all that humanity and protection which their helpless and degraded condition requires; but others among them are furious maniacs, who often
amuse themselves in their malevolent fits, by t
ing and sometimes murdering such unfortun
sons as may happen to fall in their way; a
few are the most depraved wretches in existen
assume the character of insanity, that they
an easy subsistence, and have full liberty to
in their brutal propensities.

This quality of saintship is considered as in
degree hereditary, descending regularly fro
to son, and sometimes even from master to
Every tribe and village almost has its tutela
to whom the inhabitants regularly carry t
fruits, and pay similar acts of superstitious
They are frequently employed as guides to t
and their presence affords the best protecti
every insult or aggression. They are not or
rated during their lives, but, after death, the
are generally held sacred; and chapels of
gonal form are often erected on the spot, w
regarded as at once the most holy oratories,
most inviolable asylums. The habitations o
ing saints are generally near these tombs of
cestors; and are often surrounded with imp
votaries, who, from touching the garments o
ing the benedictions of these consecrated per
expect the remission of their sins, and succ
their undertakings. In these sanctuaries pr
offered up, as the last resort in desperat
treasures are deposited, as in the most secu
concealments; and a refuge is found by the
offenders, which the most powerful are afrai
late. Among the Moors, also, as among
Mahommedans, those persons who have made
grimage to Mecca, are held in the highest
tion; are considered as having received at
remission of sin and an increase of perfection
nominated Hage, that is, "holy;" and are al
dressed by the title of Seedy, or "my lord.'
the camels and horses which have made thi
journey, are counted Hages; are well fed, e
from labour, and permitted to graze at ful
wherever they may choose to stray. Hospit
alms giving are the cardinal virtues, and the i
sable obligation of Mussulmen; but the Moors
deficient in those duties, than the Turks a
other followers of Mahomet. Their standa
nevolence, indeed, is not very high; as no o
bound to bestow alms who does not possess
or 30 sheep, or 200 pieces of silver; and w
have given 6d. in the pound to the poor, they
sidered as having yielded complete obedien
precept.

The state of knowledge in Barbary is lo
extreme; and the modern Moors have not t
lest portion of the literary spirit of their a
They are not deficient in natural genius and
but their minds are degraded by their oppre
vernment, and cramped by their limited ed
In the state of childhood, they display an un
share of acuteness and vivacity; and are rem
while at school, for their memory and ap
but after having been taught to repeat a f
passages from the Koran, and perhaps also

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* Called *Marabous* by Abbé Poiret, *Marabouts* by Lempriere, *Marabutts* by Shaw, and *Maraboots* by Jack

and write, their progress in learning is terminated, and they are allowed to grow up without any farther discipline or instruction. There are still some remains of literary institutions in the city of Fez; and the children of the more wealthy Moors are sometimes sent thither to acquire a more accurate knowledge of the Arabic language, and to be instructed in the religion and laws of their country. Their studies, however, are confined to the Koran and its comments; or, at the utmost, to the cultivation of poetry, to which their language is admirably adapted. They generally record any extraordinary event in rhyme; and the young men sometimes hold extemporary, poetical conversations, in which they display an astonishing fluency of expression, and accuracy of measure. One great trial of skill on these occasions, consists in proposing enigmas in verse, of which another person expresses the solution in corresponding measures. The rest of their literature is composed of a little inaccurate geography, and some tiresome memoirs of modern transactions among themselves. They have no conception of the speculative sciences, and wonder at the folly of Europeans, who bestow time and expense upon such pursuits. They are utterly ignorant of mathematics; and regard as unmeaning curiosities the few philosophical instruments of their ancestors, which have been preserved among them. Of the MSS. which they possess of the works of several learned Arabians, those only are considered as worthy of perusal, which treat of astrology and magic. The elementary operations in algebra and arithmetic are not understood by one in twenty thousand; but they display the greatest ingenuity and quickness of apprehension in making calculations by memory, and communicating the results, by touching each others fingers. Their most profound astronomers do not possess sufficient skill in trigonometry to construct a sun dial. Their whole art of navigation consists in what is called pricking a chart, and distinguishing the principal points of the compass. Their highest attainment in chemistry is the distillation of rose-water. The extent of their physiology is to distinguish the figures of a few plants and animals in a Spanish edition of Dioscorides. The amount of their medical skill is to know the properties of a few simples, and to accompany the application of these with suitable incantations. They depend chiefly upon topical remedies, and seldom make use of internal medicines. They can scarcely even be brought to conceive how a substance, received into the stomach, should be able to reach the head or the extremities. A decoction of ground pine is frequently used in fevers, of arisarum in the stone, and of hanzæra in the venereal disease. The gall of the bird *houbary* is in great esteem as a cure for sore eyes; and a composition of myrrh, saffron, aloes, and myrtle berries, is given in the plague. A drachm or two of orbanche root is given in diarrhæas; and round birthwort is a sovereign remedy for colics and flatulences; but the great resource in all distempers is the hammams or natural hot baths and springs. Their surgery consists much in bleeding, cupping, scarifying, and fomentations. In rheumatism and pleurisy, they scarify, or puncture with red hot iron, the place that is affected. They sometimes evacuate the water, in hydrocele, with a lancet; and even couch for the cataract, with a piece of thick brass wire, terminating gradually at one end in a point not very sharp. Simple and gun shot wounds are healed by actual cautery, or by pouring fresh butter boiling hot into the sore; and the roasted leaves of the prickly pear are applied as warm as possible, to bruises, boils, and other inflamed swellings. The bite of venomous animals is cured by burning or cutting deep upon the wounded part; or by burying the patient to the neck in hot sand to produce perspiration; or, if no great danger is apprehended, by applying merely hot ashes, or the powder of alhenna, with two or three slices of onion, by way of cataplasm. They occasionally inoculate for the small-pox, upon the fleshy part of the hand between the thumb and forefinger; and in these cases they think it necessary to purchase the matter from an affected person, by giving a few nuts or comfits in exchange. The patient is kept warm; fresh butter is rubbed upon the skin to prevent pitting; 6 or 8 grains of alkermes are now and then administered to throw out the pustules; and the eye-lids are tinged with lead ore to prevent the ulcers from falling upon the eyes.

Mechanic trades.

The mechanic arts, likewise, are in a very rude state among the Moors; and seem to have undergone no improvement whatever for many ages past. Their tools are very few and simple; their implements of husbandry, &c. especially their ploughs, mills, looms, forges, are all in miniature, and, at the same time, most clumsily constructed. A goldsmith, for instance, will come to work for his employer in the corner of a court, where he soon fixes his stall. His anvil, hammer, bellows, files, and melting laddles, are all brought along with him in a bag: His bellows are made of a goat skin, into which he inserts a reed; and holding this with one hand, he presses the bag with the other, and thus kindles and blows his fire. Other trades are carried on with the same rude simplicity; and yet, so ingenious are the workmen, that they can accomplish comparatively great things, by the most inadequate means. Their wants indeed are few, and easily supplied; and it is only the most useful and essential arts, that are generally practised among them.

Architecture.

The art, with which they are most conversant, and in which they display most knowledge, is that of architecture. Their mode of building seems to have continued from the earliest ages, without the smallest alteration; and appears, upon the whole, to be well adapted to the climate. They are not capable, indeed, of producing any scientific plans, or elegant proportions; and the distinguishing character of their edifices is massy strength. But their cement is peculiarly excellent; and is very probably the same kind, which has been employed in the most ancient fabrics. It is composed of one part of sand, two of wood ashes, and three of lime, which, after being well sifted and mixed together, is beaten with wooden mallets, three days and nights without intermission, and frequently sprinkled, during this operation, with a mixture of oil and water. For the purpose of connecting the earthen pipes of their aqueducts, they beat together only tow, lime, and oil, without any water. Both these kinds of cement acquire, in a short time, the hardness of stone; and are completely impenetrable by water. The walls of the cities and

Houses.

houses of Barbary are generally built of tabby or tabia, which may be called an artificial stone, and which seems to be a remnant of ancient Moorish art. It is a species of mortar, consisting of lime, sand, and small stones, put into wooden frames, (which are removed when the work is dry,) and beaten together with square rammers. The mosques, palaces, and other public edifices, indeed, are frequently faced with hewn stone, or marble; and some of these structures are of very great extent, comprehending a number of buildings, surrounded by a wall like a separate town. Their roofs are sometimes of a pyramidal form, and covered with green varnished tiles, which give them at a distance a very lively and agreeable appearance. In the towns and villages the streets are very narrow, seldom paved, never cleaned, and generally heaped with dust and filth. On each side there is frequently a row of shops, and behind these are the outer walls of the houses, which are, for the most part, of a rude construction, that the owners may not be suspected of being rich. The entrance into these habitations, from the street, has a very mean appearance; and the first apartment is very commonly a kind of stable, or, at least, a porch or gateway surrounded with benches for the reception of visitors. Through this vestibule is the passage into a square court, which has sometimes a fountain of water in the centre, and a porch, supported by pillars, along each of its four sides. This open space, in the houses of the opulent, is paved with marble, or with chequered tiling; and in sultry weather (especially when employed, as it often is, for receiving company) is covered by a sheet or veil, which is expanded upon ropes from one side of the parapet wall to the other. The houses are sometimes two, and even three stories high; and, in these cases, there are galleries for each flat, passing along the whole inside of the court, in the same manner as on the ground floor: But they seldom consist of more than one story, about 16 feet in height. Each side of the court generally forms one long, narrow apartment; and one of these rooms frequently serves a whole family, as a lodging. The entrance into these chambers is from the inner sides of the court, by means of large, folding doors, which are generally left half open to admit the light and air; and which are therefore furnished with hangings on the inside. These doors are ornamented with chequered pannels or carving; and are sometimes made altogether of stone, moving upon pivots, fitted to sockets in the lintel and the threshold. The ceilings of the apartments are generally of wainscot, neatly painted or studded with gilded mouldings; the upper part of the walls is adorned with fret-work or stucco figures; while the lower space nearest the floor is covered with hangings of coloured cloth, or of the skins of lions and tygers, suspended upon hooks, and thus easily taken down or put up at pleasure. But sometimes, instead of these curtains, the sides of the rooms are ornamented with looking-glasses of various sizes, or with watches and clocks in glass cases, or with a display of muskets and sabres fancifully arranged. There are no fire places in the apartments; and the victuals are prepared, in a corner of the court, in an
earthen stone heated by charcoal. The flc
laid with painted tiles, or plaister, and cover
mats or carpets. Along the sides of the w
ranged mattresses and bolsters, upon which the
sit during the day, and generally sleep du
night. At the same time there is, also, at on
the chamber a little gallery, raised above the
the height of three, four or five feet, in wh
beds are frequently placed; and sometimes in
these, an European mahogany bedstead may
in the houses of the wealthy, but this is inte
ther for ornament than use. As the use o
and tables are unknown in this country, the
ing part of the furniture consists of a cloc
arms, a tea equipage, and some china vessel
Moorish houses are very dark and gloomy;
windows are extremely small, and all look
court, except perhaps one lattice or balcony
the gateway towards the street, which ho
very seldom opened, unless on festival days
stairs are either in the porch, or in the corner
court. The roofs are flat, covered with plais
surrounded with a parapet: There the femal
the family are accustomed to walk and amus
selves in the cool of the evening. To the hab
of the more wealthy, an additional buildin
quently attached, called the *Alee* or *Ole*
apartments of which are used as wardrobes, a
of greater retirement, or as a lodging for st
The houses are generally whitened on the o
and appear, at a distance, like vaulted to
church-yard. The villages are always in th
bourhood of the towns; and are composed o
stone, earth, and reeds, surrounded with th
high hedges.

The encampments of the Arabs, which a
rally at a distance from the cities, consist of a
of tents, from 3 to 300, and are called *D*
Each of these is under the authority of a Sh
Shaik,) who is appointed usually by the gov
in whose territories they reside, and who is co
the man of most property in the tribe: The
bers, however, assert the privilege of choosi
own chiefs. The coverings of the Arab t
made of a coarse thick stuff, of woollen, of
and goats hair, or of palmetto leaves; an
ways dyed of a black or brown colour. Th
is broad and low, about 8 or 10 feet in
and between 20 or 25 in length, having the
ance, according to the description of Sallus
inverted boat: "*Edificia Numidarum, quæ*
illi vocant, oblonga incurvis lateribus tecta, q
vium carinæ essent."[*] They are divided in
rate chambers by means of curtains; and
these is always allotted for the calves, foals, a
Their furniture is exceedingly simple, consist
of a little straw, a mat, or coarse carpet for
a few earthen vessels for cooking, a wooden
draw water or hold milk, a goat skin to c
butter, and two portable mill-stones to g
corn. The poles, which support the roo
tent, are furnished with a number of hooks
upon which are suspended their clothes, bask

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[*] *Dou-wars*, according to Shaw; *douares*, according to Abbé Poiret; *douhars*, according to Lempriere and Che
douars, according to Jackson.

s, mats, &c. These tents are generally arranged the form of a crescent or circle, and sometimes of blong square. The flocks and herds are brought ight into the area; the entrance of the douar, the vacant spaces between the tents, are then closed with bushes and thorns, as a defence against beasts rey; while there is in every encampment an adnal guard of ferocious dogs, which bark with t fury at the approach of strangers. In the cenof the douar there is generally a large empty tent, ch serves the purpose of a mosque, a school-house, a lodging for the traveller. The Berebbers have itations very similar to those of the Arabs; but, tead of tents, they frequently construct huts of cker work, daubed over with mud; and a collecn of these is called a *Dashkra*.

The inhabitants of Barbary are remarkably abstezious in their diet; and can subsist upon a very small antity of the simplest nourishment. The lower asses, especially among the Arabs, live chiefly upon e roots of vegetables, wild fruits, and a mixture of eal and water; a few balls of which, or a few dates, d a draught of camel's milk, will often support em, on a journey, for a whole day. The principal sh among all ranks, from the prince to the peasant, cuscasoe,* a kind of granulated paste made of flour ry coarsely ground, heaped up in a vessel full of all holes, placed above the pot, in which the vegebles or flesh meat is boiled, and in this manner wed by the rising vapour: It is then mixed with up, milk, butter, honey, spices, pot-herbs, or anial food. The more opulent persons have various eparations of almonds, dates, sweet-meats, milk, ney, and other delicacies; and all ranks in Barbause a great proportion of bread, of which they ten make a meal, with the addition of a little oil, egar, or milk. The Moors, agreeably to the Jew custom, cut the throats of all the animals, which y use for food, at the same time turning their heads wards Mecca in adoration of their prophet; and, after fering them to bleed freely, they carefully wash ay the remaining blood, and divide the meat into all pieces about 2 lbs. in weight. The natives of rbary are very regular with respect to their hours eating. They breakfast soon after day-break; e a slight repast about noon; and make their prinal meal at sun-set. At these seasons, a large, flat then dish, full of the prepared food, is placed upon low, round tray, or merely set upon the floor. round this the family seat themselves, cross-legged, pon mats; and, having previously washed their ands, they tear the meat with their fingers, and rm it along with the cuscasoe into little balls, hich they throw with a dexterous jerk into their ouths. They make no use of knives and forks, and ery rarely even of spoons. The male part of the faily eat in one company; the females in another; and he children, with the servants, in the third. But among he Arabs and Berebbers the master of the tent geneally eats alone; the dish then passes to the children; ext, to the wives; and, lastly, to the domestics. After eating they again wash their hands, mouth, and beard; but sometimes content themselves with wiping their fingers on their clothes, or in the woolly heads of their negro slaves. It must be observed also, that, before beginning a repast, and even before entering upon any kind of work, they reverently utter the word *Bismillah*, that is, "in the name of God;" and upon concluding their meals, or completing any undertaking, they say, in like manner, *Alhandillah*, that is, "God be praised."

Luxuries.

One of the greatest luxuries among the Moors is tea, which they greatly prefer to coffee; but, as it is a very scarce and expensive article in Barbary, it is used only in the houses of the rich. In order to prepare it for use, they put some green tea, a little tansy, the same quantity of mint, and a large proportion of sugar, into the pot, at the same time; and then fill it up with boiling water. After it has been infused a proper length of time, it is poured out into very small china cups, and taken without milk. Of this refreshing beverage, they drink very great quantities, whenever it is introduced, and continue slowly sipping it with great relish, for the space of two hours together. Besides using snuff, they take much pleasure in smoking tobacco; and, for this purpose, they use a wooden tube about four feet in length with an earthen bowl. They often mix with the tobacco the cut leaves of the *hashisha*, or African hemp plant, which produces a kind of sensual stupor, and excites agreeable dreams. The *kief*, which is the flower and seed of the *hashisha*, is still more powerful in its effects; and about one common English tobacco pipe-full is sufficient to produce complete intoxication. This they prefer to opium, wine, or brandy; and so great is the infatuation of those who use it, that they cannot exist without its exhilarating or rather stupifying influence. They have several other plants of a similar quality; among which the nuts of the palma christi hold a principal place, and have the remarkable effect of intoxicating a person for the space of three or four hours, in such a manner, that he completely opens his mind, and utters all his thoughts.

Dress.

The Moors have in general rather a superabundance of clothing, which very much conceals the form of their persons; but the fashion of their dress is supposed to be very ancient, and bears a great resemblance to that of the patriarchs, as represented in paintings. That of the men consists of a red cap, or turban, and frequently of both, the latter being wrapped round the bottom of the former, and serving often to distinguish the rank or profession of the wearer, by the number and fashion of its folds; a pair of linen drawers, reaching to the ankle, over which they sometimes wear another pair of woollen cloth; a linen, cotton, or gauze shirt, generally hanging over the drawers, with large and loose sleeves; a vest, or tunic, called a caftan, resembling an European great-coat, generally made of cotton in summer, and of woollen in winter, sometimes with and sometimes without sleeves, connected before with very small buttons down to the bottom, and fastened tight around the body with a sash; a sash or girdle of worsted, fine linen, cotton, and sometimes of silk, in which are frequently stuck a knife or dagger, and one end of which is sewed up to serve as a purse; a velvet cord, crossing over the right shoulder, and suspending a sabre on the left side; yellow slippers on their feet, instead of shoes, but no stockings on their legs. This is their usual dress, when in the house, or when employed in any kind of work; but, when they go abroad, they throw over all, in a careless but elegant manner, a garment of white cotton, silk, or wool, called a *hayk* *, five or six yards in length, and about two in breadth, very similar to the Scotch plaid, and supposed to be the same as the *peplus* of the ancients. Instead of this, and frequently above it, they use occasionally a blue cloak with a hood, called a *burnose*, made of woollen cloth, and of a very close texture, so as to resist the rain. The Moors wear their beards long, but have their heads shaved, except a single lock in the middle. The more wealthy have plain gold rings upon their fingers; and frequently carry a rosary in their hands, more by way of ornament, than for any religious purpose. The Arabs wear no linen, and, except in paying visits, (when they always put on drawers), have seldom any other garment, than the hayk, which serves them at once as a covering through the day, and a bed during night. They fasten the two upper corners before the breast, and over one of the shoulders, with a wooden bodkin; and then wrap the rest of the robe about their bodies, while the outer fold is generally employed to hold such articles as they may have occasion to carry. Their heads are almost always without any covering, except a narrow fillet around the temples to bind up their hair, or the hood of the burnose drawn up during a shower. On the confines of Sahara, they are often completely naked, or, at most, have only a pair of thin drawers. The Berebbers wear the drawers and the burnose. The dress of the Jews differs very little from that of the Moors, except that their cap, slippers, and outer garments, must always be of a black colour. Lepers are obliged to distinguish themselves, by wearing a straw hat, with a very broad brim, tied on in a peculiar manner. The natives of Barbary are scrupulously cleanly with regard to the insides of their houses; and cannot endure the slightest contamination to remain near the place where they sit. The frequent ablutions, also, imposed by their religion, (though often performed in a very slovenly manner,) tend to give them a great appearance of personal cleanliness; but their garments are very seldom washed, and are generally in a very disgusting state of filth.

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* *Cuscasowe*, according to Shaw; *cousconsou*, according to Abbé Poiret; *cuscosou*, according to Lempriere; *cooscasoo*, according to Chenier; and *cuscasoe*, according to Jackson.

Women.

The condition of the women in Barbary is the same as in other Mahommedan countries. Reared in ignorance, and imprisoned in their apartments, they are rather the slaves than the companions of their husbands. Those, who reside in towns, seldom leave their houses, except for the purpose of visiting one another; and, when they do go abroad, they are so completely veiled, that they cannot be distinguished by their nearest relations. On these occasions, women of rank always ride on mules, or
in litters, attended by a slave; and it is on
vants, the aged, and the very lowest of t
who are seen walking in the streets. A
Arabs, and the inhabitants of the village
men have more liberty; but they have al
bour. They are continually occupied in
the loom, grinding corn with the hand-
ing the provisions, attending the cattle, a
day of fatigue, have to trudge, often tw
miles, perhaps, with their infants on their
bring water. They are generally requir
equip the horses, to take down and pa
tents, and sometimes to carry heavy burde
while the lazy Arab is riding at his ease.
subjected in short to every species of drud
it is even affirmed, that, in some parts of
try, they are occasionally yoked with th
the labours of the field. The women of
try are generally handsome; and have a
gree of rustic simplicity in their manne
persons are rather below the middle statur
ably fat and square, with large hands
Their faces are round; their nose and mo
and their countenances, though beautiful,
cient in expression. They have, howev
noble gait, a complexion as fair as the
Europe, and, except when descended fro
does, their eyes and hair are universally
the inland districts, especially towards
west, and in some particular cities, such as
Mequinez, they are said to be exquisitely
The lower classes, indeed, and especially the
men, who are seldom veiled, have a very sw
plexion, and are rarely well-favoured. T
are generally seen in the streets, are roun
bundles, resembling bales of cloth in mo
vered to the mouth with woollen, and starin
a dirty rag hanging over their face, they
gether a very hideous and disgusting a
Corpulency is considered as their princip
and the fattening of young women thus
very important object of domestic attentio
der to promote this growth of beauty,
their food a powder called *elhouba*; an
great quantities of paste heated in the steam
water. But their sedentary manner of li
butes perhaps more effectually, than all ot
to produce that plump habit of body, for
are distinguished. Their dress consists o
shirt, and tunic, nearly resembling those o
except that the neck of the two latter is
and the edges generally ornamented with e
To their girdles of silk, or crimson vel
tached two broad straps, which pass unde
over the shoulders, forming a cross upon
and suspending a gold chain in the front.
which it is their great pride to have ve
plaited backwards from the forehead, in a
folds, hanging loose behind, but fastene
at the bottom by a little twisted silk. A
row stripe of gauze or silk is then wrap
the hair in such a manner, that the ends i
with the tresses, and hang down behind

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* *Hyke*, according to Shaw; *haick*, according to Lempriere; *haique*, according to Chenier; *hayk*, according

the ground. A handkerchief of linen, crape, or common silk, surrounding the head like a close cap, and collected in a bow behind, covers and completes the head dress. At the upper part of the ears, they have a small gold ring with a cluster of precious stones; and at the lower part, another ring and cluster of a larger size. They wear also rings on their fingers, bracelets on their wrists, rims of gold or silver on their ankles, and a variety of necklaces composed of beads, pearls, or gold chains. They sometimes use a kind of loose stocking to give the leg a thicker appearance; and wear slippers, always of a red colour, and generally embroidered with gold, which they take off, when they enter their apartments. Besides the veil and hayk, with which they cover their heads, when they walk out, they sometimes wear also straw hats, with a view to keep off the rays of the sun. The dress of the lower classes consists chiefly of drawers, and a coarse woollen tunic tied round the waist by a band, with a common handkerchief upon their heads; but frequently in the house, and especially in the tents, they have no other covering than a towel round their loins. At all times, however, and in the midst of all their drudgery, the lowest and most wretched among them are loaded with all the trinkets which they possess, such as ear-rings, bracelets, necklaces, and even small looking-glasses hanging on their breasts: This may be partly owing, indeed, to their having no proper place in which to deposit them. The women of the Jews are the most handsome, and the most inclined to intrigue. Those of them who are married, are not required to wear veils; and are permitted to walk about, without much restraint Their dress is similar to that of the other Barbary females, except, that instead of drawers, they generally wear petticoats of green woollen cloth, with embroidered borders. All classes of women in Barbary are addicted to the use of various paints or cosmetics, to which may, in a great measure, be ascribed that shrivelled and aged appearance which their faces acquire at a very early period of life. They stain the corners of their eyes, their eye-lids, and eye-brows, with a black pigment, a preparation of lead ore; and it is accounted a great addition to their charms to have a long black stripe across the forehead, along the ridge of the nose, on the cheeks, and from the chin down to the throat. They paint their cheeks and chin, the nails of their fingers and toes, and the inside of their hands and feet, with a deep red. They frequently also tinge the whole of their hair, hands, and feet, with a herb called *henna*, which produces a deep saffron, or bright orange colour; and which imparts a pleasing softness and coolness to the skin. Most of the women among the Arabs and Berebbers imprint, with needles and gun-powder, the forms of flowers and other objects, on their face, neck, and other parts of their bodies. The women of this country very soon attain the state of puberty; are frequently mothers at eleven or twelve years of age, and grandmothers at twenty-two or twenty-three; and, as they live as long as Europeans, they generally witness several generations of their posterity. They lose their bloom, however, and cease from child-bearing about the age of thirty. They suffer very little inconvenience at the birth of their children; and are frequently on foot the next day, going through the duties of the house, with the new-born infant on their back.

Marriages.

The natives of Barbary marry at a very early age; and generally without having had much opportunity to establish an attachment of affection. In forming matrimonial connections, the parents of the parties may be said to be the only agents; and it frequently happens, that the bride and bridegroom do not see each other till the ceremony be performed: It is from their mothers or confidential servants that they learn the personal accomplishments and character of their intended helpmates. In most cases, however, the young man procures some opportunity of seeing his mistress at a window, or in some such distant manner; and should the interview prove mutually agreeable, he then proposes his wishes to the father. Should his offer be admitted, he sends presents to the lady, according to his circumstances; and if these be accepted, the parties are considered as betrothed. It is not expected that the bride should bring a portion along with her; but, on the contrary, the husband often pays to her parents a species of purchase-money: He specifies, at least, a certain sum to be given to her, should she happen to survive him, or to be divorced. If the father, however, possess much wealth, he generally presents his daughter with a supply of ornaments, and also allots her a suitable dowry; but all this is considered as her own property, and must be faithfully restored in the event of a separation. These arrangements are all made in the presence of the cadi by the friends of the parties; and this public transaction constitutes the marriage-contract. During several days before marriage, the bride remains at home to receive the congratulations of her friends, to be instructed by the *talb*, or priest, in the duties of the married state, and to undergo the process of a fresh painting. During this period, the bridegroom receives the visits of his friends in the mornings; and in the evenings is paraded through the streets on horseback, attended by a musical band of hautboys, drums, triangles, &c; and surrounded by his male relations and acquaintances, who testify their joy, on these occasions, by dancing and jumping, and twirling their muskets in the air, by exhibiting their horsemanship, and by firing in the face and at the feet of the bridegroom. On the day of the marriage, the bride is placed in a square vehicle, about twelve feet in circumference, covered with white linen, or variegated silk, and fixed on the back of a mule. In this litter, she is carried through the town in the midst of her relatives and companions, accompanied with the light of torches, the sound of musical instruments, and frequent vollies of musketry. In this manner she is conducted to the house of her intended husband, who returns, about the same time, from a similar exhibition; and great care is taken, that she do not touch the threshold of the door, as she enters. She then sits down, with her hands over her eyes, and the company retires; the bridegroom is introduced to her alone, perhaps for the first time; takes off her veil, and receives her as his wife, without any farther ceremony: Sometimes, indeed, especially among the Algerines, it is customary for the parties to plight their faith, by drinking out of each others hands. After the marriage, the friends are entertained with feasting and amusements, a greater or a smaller number of days, according to the wealth of the parties; and it is considered as incumbent on the man to remain at home eight days, and the woman eight months after their union. The husband has power to divorce his wife on various accounts, such as barrenness, unchastity, &c.; and the wife possesses a similar power, if her husband should fail to provide her with sufficient subsistence, or should three times utter curses against her. In Barbary, as in other Mahommedan countries, four wives are allowed to one husband; and as many concubines as he may choose to support. The Moors, however, seldom avail themselves of this indulgence; and in a population of 100,000 souls, scarcely 100 men will be found, who possess the number allowed by the law. Even among the Bashaws, and other great men, the number of their wives increases only by degrees; and an additional one is seldom taken, till the former have lost their bloom. The first married, however, especially if she have born a son, is always regarded as the mistress of the house; and the younger wives are taught to pay her all due respect. The concubines are generally black women, who reside in the house along with the wives, and perform the menial offices of the family. The children of the wives have all an equal share of the effects of their father and mother; but those of the concubines can claim only half the proportion of the others. The marriages of the Arabs are conducted in a manner very similar to what has now been described; but are often celebrated with much greater show, and by much larger companies. The friends of the parties provide them with a tent and its simple furniture; and each brings to the joint stock a proportion of cattle and of grain. Though they generally wear nothing but woollen clothing, yet it is a custom, in many tribes, that the bridegroom and bride shall have each a linen shirt at their nuptials; but this they must neither wash nor put off, as long as it will hang together.

Rank. The Moors are equal by birth, and know no difference of rank, except what is derived from official employments; and even this is not retained, after these offices are resigned. The exercise of the mechanical trades is never considered as, in the smallest degree, disreputable; and the governor or judge of a town would never think himself degraded by giving his daughter in marriage to a common artificer: The meanest man in the nation may thus aspire to a matrimonial connection with the most opulent. Persons bearing the name of Mahommed, which is generally given to the first male-child born in wedlock, are always addressed by the title of Seedy, synonymous to Signor.

Salutations. The usual mode of salutation in Barbary is to put the right hand on the breast, to make a gentle inclination of the head, and in this posture, to give the salem aliok, or the wish of peace. If the parties are intimately acquainted, they shake hands with a very quick motion; or merely make the extremities of their fingers meet, and then each puts his own to his lips; or mutually embrace, kissing the forehead, shoulders, or beard. They then inquire after the health of the relatives in due order; and, among the Arabs, on these occasions, the mare, flock, and even the tent are not forgotten; but while putting these questions, they seldom wait for a reply, and are often far beyond each others hearing, before they have finished their civil interrogatories. When they accost a superior, they make the hayk, which is usually thrown loosely over the head, fall back upon the shoulders; generally pull off their slippers as they approach, and respectfully kiss his hand, or merely that part of his hayk which covers his arm, or sometimes even his feet. The superior, in these cases, presents the back of his hand for salutation; and it is accounted an indication of great favour, when he offers the palm. The compliment due to a sovereign, and to any of his family, is to uncover the head, and then to prostrate or rather bend the body to the ground. It is common in Barbary to address a peculiar salutation to a person who is eating, drinking, smoking, sneezing, or belching; namely, *saha*, "may it do you good."

When the inhabitants of Barbary pay visits to each other, they generally ride on mules, rather than horses; and pride themselves greatly upon being attended, on these occasions, by several running footmen. They are not always received into the house; but, if the weather be fine, a mat or carpet is spread before the door; and upon this they place themselves in a circle, cross-legged, or resting upon their heels, while their attendants are seated in the outside in a similar manner. The streets are sometimes crowded with these parties, engaged in smoking, in drinking tea, in conversation, or in gaming. If the company be large, and an entertainment be given, the inner-court is frequently the place of meeting; and, on these occasions, a kind of veil or curtain is generally extended from the parapet walls, to shelter them from the heat or inclemency of the weather. The master of the house, when receiving his guests, remains upon his seat, takes their hand as they advance, inquires after their health, and directs them to their place. Whatever be the time of the day, tea is introduced, during the visit, in the houses of the opulent; and is accounted the greatest civility that can be shewn to the company. When a stranger arrives to lodge in the family, the first compliment offered is water to wash his feet, (which the circumstance of walking barefoot, or at most in loose slippers, renders a very necessary and acceptable ceremony;) and, in such cases, the master of the house is always the most active in doing the most menial offices to his guest.

The common topics of conversation among these people are, the occurrences of the neighbourhood, with respect to which, they testify the most eager curiosity; their religious tenets, which the talbs, or men of letters, embrace every opportunity of introducing, in order to display their own acquirements; their women, on which subject their discourse is exceedingly low, trifling, and indecent; and, lastly, their horses, upon which it is accounted the greatest of all accomplishments to be able to harangue. In conversation, the gestures of the Moors are lively, graceful, and expressive; their accent peculiarly strong and sharp; and their voice remarkably full and sonorous. When they become hot and quarrel-

, they indulge in the most opprobrious language,
perhaps collar each other in their rage, but very
m come to blows; though it sometimes happens,
a dispute is finally terminated by assassination.
he natives of Barbary are indolent to a very
ishing degree, unless when accidentally roused
me sudden fit of exertion; and hence their amuse-
s are always in extremes, either of the most seden-
or of the most violent description. They may
be seen in considerable numbers sitting on their
, leaning against a wall, in complete apathy and
ce, smoking their pipes, stroaking their beards;
peating their prayers with a rosary in their hands,
nversing together with the utmost vehemence.
y are so extremely averse from standing or walk-
that, if two or three should chance to meet, they
tly squat themselves down on the first clean
which they can find, though the interview may
e intended to last above a few minutes. They
great part of their time in the barbers' shops,
h are the chief places of concourse, and the great
es of all intelligence; or in the coffee-houses,
ing tea and coffee, or playing at a kind of chess, in
they are very expert; but all games of hazard
rictly prohibited by their law, and they seldom
for money in any case. Tribes of wandering his-
s, or romancers, often amuse the vulgar by their
erful relations; and dancers and jugglers by
tricks and agility. The young men, and espe-
the soldiery, often make merry with their con-
es, with wine and music, in the taverns, or in
ields. The natives of this country are, in gene-
greatly delighted with music; and their quick
are very beautiful and simple; but their slow
have a tiresome, melancholy sameness. Their
ipal instruments are the hautboy, the mandoline,
panish instrument), a violin with two strings, the
, the common pipe and tabor. Their more ac-
diversions are, leap-frog, jumping, wrestling, and
cularly foot-ball; in which last exercise, they do
attempt to send the ball to a goal, but amuse
selves by kicking it up in the air, without any
ite object. Another favourite amusement, or
r military exercise, in which they continue for
al hours at a time, is what they call the game of
powder; which consists in one party of horse-
riding full gallop against another, or merely to-
s a wall, suddenly stopping short, dischaiging
muskets, and retiring to resume the onset.
se are considered as the most expert in this
ement, who advance nearest the wall, and who
short most instantaneously. This is their mode
gaging in battle, and also of complimenting a
ger. They load their pieces with loose powder;
up violently to the persons, whom they mean to
e; and then suddenly checking their horses, dis-
ge their muskets full in the face of the ho-
ed individual.

he care and management of their horse is their
test pleasure and accomplishment; and it must
dmitted that they excel in horsemanship. Their
e of training and riding, however, is very cruel
pernicious to these noble animals. They break
in when very young, by making them perform
and fatiguing journies, over a mountainous and rocky surface. They then teach them to rear up, to stand fire, to go at full speed, and to stop short, as has been described. Their horses, of consequence, have no other pace than a walk or gallop; and, by being broken in so early, and treated so barbarously, they are very soon rendered unfit for service. Their bridles have only one rein of very great length, which serves also the purpose of a whip; and the bit is so constructed, that, by a very slight pressure on the horse's tongue and lower jaw, it fills his mouth with blood; and, if not used with the utmost caution, would be so powerful in its check, as to throw him completely on his back. Their saddles are in some degree similar to the Spanish; but the pummel is still higher peaked, rising in a perpendicular direction, while the back part is elevated in such a manner, as to support the rider, as high as the loins. They are covered with red woollen cloth, or even with red sattin; and are fastened upon the horse by one girth round the body, and another across his shoulders. The stirrups are hung very short; formed so as to cover the foot, like a slipper; and placed far back, so as to give the rider a firmer seat by inducing him to grasp the horse's sides with his knees. The spur is a spike, about six inches in length, hung loosely at the heel of the stirrup, a very barbarous looking weapon, which appears to a stranger ready to rip up the sides of the animal, but which a skilful rider keeps always between four or eight inches from the horse's belly, and seldom uses it so as to do him any injury.

Hunting.

Among the amusements of the Moors may be mentioned the sports of the field, such as hawking, which is much practised in the kingdom of Tunis, where there is a great variety of falcons; and fowling, in which the sportsman makes no use of dogs, but conceals himself under an oblong frame of canvass, painted like a leopard, in which are two or three holes, that he may perceive what passes, and may push out his musket when he is sufficiently near to the birds. They often take partridges by tunnelling, or inclosing them in a net by means of a decoy bird in a cage; and sometimes by springing the coveys repeatedly, till the birds become fatigued, when they take them with dogs, or knock them down with sticks. A whole district is often assembled to hunt the lion and leopard. The company encompass a space of three or four miles in circumference, gradually contracting their circle as they proceed; the footmen with dogs and spears advancing in the front, while the horsemen are a little behind, ready to charge upon the first sally of the wild beast. Sometimes they form traps for these animals by digging holes in the ground, formed like an inverted cone, and slightly covered with earth. At other times, the Shelluhs and Berebbers take their station, near the resort of these destructive animals, sometimes on the top of a tree, and sometimes in small round towers built for the purpose, with a hole or two in the wall for the musket; and will patiently remain in these places for whole days, living on barley meal and water. Their manner of hunting the hyæna is also very singular, and deserves to be particularly mentioned. Ten or twelve persons repair to the cave, which the animal is understood to frequent, and in which he always remains through the day. One of these strips himself naked, seizes a dagger in one hand, and taking the end of a rope with a noose in the other, he advances gradually into the cave, speaking gently, with an insinuating tone of voice, as if with a view to fascinate the hyæna. When he has reached the animal, he stroaks his back in order to soothe him, dexterously slips the noose round his neck, throws a piece of cloth over his face, pulls the rope at the same instant to indicate to his companions that it is fixed; and then, retiring behind, urges the animal forward, while the dogs attack him in front, as he is dragged along. In the pursuit of the ostrich, the Arabs make use of the desert horse, and set out in a party of twenty or more, riding gently against the wind, one after the other, at the distance of about half a mile asunder, till they discover the foot marks of the bird. When they come in sight of their game, they rush forwards at full speed, always observing the same relative distance. The ostrich finding her wings an impediment to her progress when thus moving against the wind, turns towards her pursuers, endeavouring to pass them; and though she may escape the first or second, she is generally brought down by the musket or bludgeon of those that follow.

Diseases.

The natives of Barbary are subject to many loathsome and distressing diseases, which are greatly aggravated by their extreme deficiency in medical knowledge. The most prevailing distempers are, the falling sickness, which is generally confined to women and children; a temporary headache, which arises from sudden stoppage of perspiration, and is chiefly removed by using exercise; inflammation of the eyes, frequently terminating in total blindness, and arising probably from the strong reflection of the sun's rays by the whitened houses; complaints of the stomach, proceeding from bile, indigestion, and the bad quality of their water; chronic rheumatisms, white swellings, and dropsies, which last disorder may be owing in a great measure to their poor living; hydrocele, which is extremely common among the Moors, in consequence of their warm climate, their loose dress, their licentious indulgences, and their immoderate use of the warm bath; the itch, which seems to be occasioned by their constant use of stimulants, and which frequently breaks out into very bad ulcers; leprous affections, which are generally hereditary, and which are very seldom completely cured; the venereal disease, brought by the Jews from Spain, exceedingly prevalent among the Africans, and for which they have no radical remedy, but from which they experience less suffering than Europeans, owing to the constant perspiration, which the heat of the climate supports, their great use of vegetable diet, and their abstinence from spirituous and fermented liquors; and, lastly the plague, which generally visits the country once in every twenty years, and which is always peculiarly destructive.

Funerals.

When any one dies, a number of women are hired for the purpose of lamentation; and they perform their duty by making the most frightful howlings, by beating their heads and breasts, and tearing their faces with the nails of their fingers. They are so expert in the expressions of grief, that they seldom fail, by their mournful sounds and afflicted gestures, to impress the funeral assembly with the
thoughtfulness and sorrow. The dead are
a few hours after their decease; and the gre
portance is attached to the rites of burial.
opinion among the Moors, as it was among
cient heathen, that the souls of those, who
received proper interment, are excluded
abodes of the blessed; and hence, it is accou
most dreadful of all punishments to be cut
and thrown to the dogs. As soon as the dy
son has breathed his last, the body is carefully
and sewed up in a winding sheet of white cl
this purpose, cloth, that has been brought fro
and blessed by the Imam of that city, is mo
valued. The corpse is next placed on a
carried on horseback, or men's shoulders,
burying ground; which is always on the o
the town, and of which every family has
walled in for their own use. All devout pe
count it a highly meritorious duty to assist
rites; and to accompany, at least a part of
every dead body which they may happen
The attendants walk two abreast, go very qu
sing hymns adapted to the occasion. The
made wide at the bottom and narrow at the
the body is deposited on its side, with the face
the east, and the right hand under the head
towards Mecca, while one of the priests
puts into the hand a letter of recommendatio
hommed. An arch is, in most cases, form
the body with branches of trees to keep
earth; different kinds of vessels and utensils
quently interred along with the corpse; larg
are placed upon the grave to resist the att
wild beasts; and a flag is finally erected
spot. It is customary for the female rela
weep at the tombs of their deceased friends
ral days after the funeral; and all, who p
burying ground, offer up prayers for the dead.
a woman loses her husband by death, she mou
months and eight days, during which pe
wears no silver or gold; and, if she happ
pregnant, she must continue mourning till
very, while the relations of her late husb
bound, in the mean time, to provide for her
ence. The men usually express their grief
staining from shaving their head, from trimmi
beard, and from paring their nails.

The manufactures of Barbary are chiefly
are requisite for the supply of the inhabitan
are seldom prepared for exportation. The
articles, produced in the country, are, the
and hayk of white wool and cotton, or cot
silk, made almost entirely by the women, an
with their fingers without the aid of a shutt
handkerchiefs, which are manufactured chiefl
city of Fez; various kinds of silk stuffs, fre
chequered with cotton; red caps, most of w
made at Tetuan; a coarse linen stuff, of wh
best is produced in Susa; carpeting, nearly
that of Turkey; beautiful matting made of th
of the palmetto, or wild palm-tree; paper o
inferior quality; muskets and sabres of Bisc
well tempered by means of certain waters in t
try well adapted for that purpose; gun-pow

very glutinous nature, exceedingly apt to imbibe humidity, and so deficient in strength and inflammability, that one ounce of European manufacture is equal to three or four of the Barbary article; but a certain Arab tribe, named Wolled Abbusebah, are said to possess the secret of making a species of gunpowder superior to any other in the world: leather, made of goat skin, the mode of tanning which they are very careful to conceal, and the softest and finest of which resembling silk, and impervious to water, is prepared at Tafilet. The manufactures of Algiers and Tunis are brought to a state of greater perfection, than those of Morocco; and the inhabitants of the northern districts are a more enterprising and commercial people, than those of the south. The Moors are utterly unacquainted with the art of casting cannon, the manufacture of glass, the invention of pumps, and the use of wheel carriages. They take no care to make or repair public roads, and have very few bridges. Hence their inland traffic is extremely limited; and is confined almost entirely to their markets or fairs, which are held in different districts for the accommodation of the neighbouring inhabitants. At these fairs they assemble, from a considerable distance, to buy and sell cattle, corn, vegetables, dried fruits, carpets, hayks, and the various productions of their country; and in one quarter of the market-place are to be found always a number of itinerant barbers or surgeons, to whom the diseased are brought for cure; while there is generally a guard of soldiers sent by the governor of the province, or of the nearest town, to prevent those bloody quarrels, which not unfrequently take place at these resorts, between the different Arab tribes. All the states of Barbary indeed, by means of caravans, carry on a very lucrative and extensive commerce with Mecca, the most consecrated seat of their religious faith; and with Tombuctoo, the great emporium of central Africa. For the expedition to Mecca, several thousands of camels, horses, and mules are collected, carrying merchandise to the value of two millions of dollars. Besides woollen stuffs, leather, indigo, cochineal, ostrich feathers, the traders never fail to take with them, or to purchase by the way, such articles of commerce, as can be sold with profit, at Alexandria, Cairo, and the other towns, through which they pass. These companies of merchants and pilgrims (for the two characters are generally united in this journey to Mecca), bring back with them Levant and Persian silks and muslins, amber, musk, essence of roses, &c. The caravans, which penetrate the interior of Africa, are neither so numerous nor so valuable as those which go to Mecca. They travel through the desert of Sahara, occupying several months in this toilsome journey; but we must refer the reader to Jackson's *Account of Morocco*, for a more particular and very interesting narrative of their perilous progress. The articles, which they transport to Tombuctoo, are linens, muslins, silks, light hayks, red caps, spices, sugar and tea, but chiefly tobacco and salt; and the produce, returned from Soudan, consists principally of bars of gold, gold dust, and gold trinkets, (in the manufacture of which the natives of that country display the greatest ingenuity,) elephants teeth, gums, and slaves, besides ambergris and ostrich feathers, collected by the way on the confines of the desert.

Political and commercial relations.

The commercial intercourse between the north of Africa and the kingdoms of Europe is extremely limited and fluctuating; and the treaties, which have been formed, at different periods, between the trading nations of Christendom and the piratical states of Barbary, were intended rather for securing protection from the African corsairs, than for promoting a mutual exchange of commodities. The instability and tyranny of the several governments in Barbary must still be regarded, as an almost insuperable obstacle to the industry of the natives, and to the confidence of foreigners. The wants of the inhabitants also are few and simple; and those habits of luxury, which are the great springs of commerce, are either altogether unknown among them, or, at least, restrained from open indulgence, by the lawless acts of extortion to which every opulent individual is invariably exposed. The little foreign traffic, which the people, or rather the rulers, of Barbary do carry on, has been chiefly engrossed, of late years, by the French, Americans, and British. The principal articles imported into the north of Africa, are, broadcloths, linens, muslins, silks, metals, hardware, mirrors, sugar, tea, gun-powder, and Mexico dollars; and those hitherto exported are, gums, almonds, dates, aromatic seeds, ivory, leather, hides, ostrich feathers, olive-oil, wax, and wool: The former, it is to be observed, are chiefly manufactured goods, and the latter, raw materials, of the most essential use in the manufactories of our own country. It has, therefore, been strongly urged by those, who are most competent to judge of the subject, that a close connection between Great Britain and Barbary might be of the very greatest advantage, both in a commercial and political point of view; that it would provide a most abundant supply of provisions for our fleets in the Mediterranean, and our troops at Gibraltar; as well as open a way for our manufactures into the very heart of Africa. It has likewise been shewn, that the northern states of that country are more inclined, than ever, to encourage such an intercourse; and that nothing is wanting to establish it on a solid foundation, than proper attention and respect on the part of the British government, and especially the appointment of agents well acquainted with the language and manners of the people. It has also been suggested, that the inhabitants of South Barbary, in particular, are very favourably disposed towards the British; that a purchase might be made from the Emperor of Morocco of his most distant and disaffected province of Suse; that at least, in consequence of his alliance, a British factory might be established at Agadeer (Santa Cruz), which would afford security both to the African and European trader, accustom the natives to the appearance and manners of foreign residents, become in a short time the emporium of Barbary and Soudan, and open a path for the progress of civilization and knowledge over these extensive regions of barbarity and ignorance. See *Letters from Barbary*, &c. Abbé Poiret's *Travels in Barbary*. Shaw's *Travels in Barbary*. Chenier's

State of Morocco. Lempriere's *Tour to Morocco.* Bruce's *Travels*, vol. i. Jackson's *Account of Morocco. Mod. Univ. Hist.* vols. xviii. and xliii. (q)

BARBER, one who trims or shaves the beards of other people, or is employed in dressing hair or making wigs. This profession, like all the other *polite* arts, is only known in those nations, which have made a certain progress in civilization. No mention is made of barbers by any Roman author till the 454th year of the city; but there, as elsewhere, when they were once introduced, they soon became men of great notoriety, and their shops were the resort of all the loungers and newsmongers in town. Hence they are alluded to by Horace as most accurately informed in all the minute history both of families and the state:

> "Omnibus et lippis notum et *tonsoribus* esse."

These convenient gentlemen seem to have been almost exclusively entrusted with the important care of adorning the persons of the public; for not only the hair and beard, but likewise the nails, received new grace from their skilful hands. Nor did their usefulness terminate here. They likewise handled the lancet with great delicacy; and had sometimes the honour of breathing a vein, or of dressing an wound, to persons of high rank and fashion. Amidst these numerous avocations, it frequently happened that their customers were obliged to wait long before they could be attended to: and to prevent them from becoming impatient, the shops were provided with musical instruments with which they might entertain themselves; the more interesting amusement of newspapers being yet unknown. Much learning has been spent in endeavouring to account for the origin of the barber's pole. Some writers, from an excessive fondness for simplifying, have referred it to the word *poll* or head. But, in truth, this party coloured staff was intended as an indication of the dignity and variety of the profession practised within, intimating emblematically, that the master of the shop was not a barber merely, but likewise a surgeon. Barbers were incorporated with the surgeons of London, but with no license to practise any branch of surgery, except drawing teeth and letting blood; 32 Hen. VIII. c. 42. They were degraded, however, from this honourable association by the 18 Geo. II. c. 15. (μ)

BARBORA, or BARBARA, an island on the eastern coast of Africa, situated opposite to a town of the same name in the kingdom of Adel. The inhabitants, who are negroes, employ themselves in trade and in the breeding of cattle. The island is very fertile, and produces corn and fruits in abundance. (j)

BARBOUR, JOHN, Archdeacon of Aberdeen, is supposed to have been born about the year 1316. "When he describes the person of Randolph," says Lord Hailes, "he seems to speak from personal observation: and as Randolph died in 1331, and Barbour in 1396, the poet, if we suppose him to have lived to the age of eighty, would be in his fifteenth year at the death of that illustrious warrior." (*Annals of Scotland*, vol. ii. p. 3.) Barbour was educated for the clerical profession; and in 1357 we find him styled archdeacon of Aberdeen. During that year the bishop of his diocese nominated him one of the commissioners who were to meet at Edinburgh, in order to deliberate concerning the ransom of their captive monarch, David II. (*Rymer*, tom. vi. p. 39.) Of the same date there is extant a passport from Edward III., which authorises him to visit the university of Oxford in company with three students. (*Ibid.* tom. vi. p. 31.) It has been supposed by Mr Warton, that he himself studied in this seminary during the years 1357 and 1365; (*Hist. of English Poetry*, vol. i. p. 318.) but for this supposition there is no just foundation. As he was then a dignitary of the church, he had certainly completed his academical studies. It would appear that, in 1365, he visited St Denis, near Paris, in company with six knights. The object of their expedition seems to have been of a religious kind; for the king of England grants them permission to pass through his dominions, on their way towards St Denis and other sacred places. (*Rymer*, tom. vi. p. 478.) About ten years afterwards he was engaged in composing the celebrated work which has perpetuated his fame, an Historical Poem on the Actions of the great King Robert. As a reward of his poetical merit, he is said to have received from the exchequer a pension which he enjoyed during his own lifetime, and which at his decease was transferred to the hospital of Aberdeen. (Hume's *Hist. of the House of Douglas*, p. 30.) From some passages in Winton's chronicle, it would appear, that he also composed a genealogical history of the kings of Scotland; but of this work no manuscript i known to be extant. Barbour, as has already bee hinted, died in the year 1396. (*Chart. Aberdon.* f. 11 MS.) Of his *Bruce* there are many editions; but th most valuable is that of Mr Pinkerton, published London in 1790, in three volumes octavo. This cu rious production is one of the oldest reliques of Scoti poetry; and in a historical point of view, it is lik wise of very considerable importance. It clear evinces, that the author was a man of no ordin learning or genius. The humanity of his sentimen and the liberality of his views, seem of a far mo modern date than the fourteenth century; and he h diffused over his narrative that lively interest whi an ordinary writer is incapable of exciting. See ving's *Lives of the Scottish Poets*, vol. i. p. 253. (

BARBUDA, or BERBUDO, or BARBUTHOS, o of the Caribbee islands in the West Indies, belongi to the Codrington family. It is about 21 miles lo and 12 broad, and is encircled with a rocky co The industry of the inhabitants supplies the neig bouring islands with cattle, sheep, fowls, and co and the soil is capable of yielding the various fru and trees which are produced in the other West In islands. The island abounds in serpents, some which are very large, and others poisonous. T island is said to yield an annual revenue of £500 Population 1500. West Long. 61° 50′, North L 17° 49′ 45″. (π)

BARCA, a district of northern Africa, bound on the north by the Mediterranean, on the south b the Sahara or Desert, on the east by Egypt, and on th west by the kingdom of Tripoli. It extends in lengt about 690 geographical miles, from 18¼ to 31 Eas the generals of Louis, king of Aquitania. Having opposed a heroic resistance for seventeen months to the continual assaults of the besiegers, it yielded to the French arms after its walls were demolished, and one half of its inhabitants destroyed by famine or the sword. In the year 985 it was taken by the Moors, who burned the city, and carried into slavery almost all the inhabitants; but it afterwards fell into the possession of Count Borel. The rebellion of the Catalonians in 1465 against Don Juan, king of Arragon, was fostered in the capital of the province. The king besieged it in vain in 1462; but on the 17th October 1472, after a siege of six months, it yielded to the superior force which he brought against it. The revolt of the Catalonians in 1640, exposed Barcelona to new dangers. It maintained its independence for twelve years against the arms of Philip IV.; but it was at last taken by Don Juan of Austria in 1652, after a blockade and siege of ten months. In 1689 it opposed an ineffectual resistance to Charles II.: In 1697, fifty days after the trenches were opened, it was taken by the French under the Duke of Vendome, though the bravery of the inhabitants was seconded by a garrison of 12,000 men under the Prince of Darmstadt. Although the citizens had sworn allegiance to Philip V., they invited the English and Dutch to deliver them from his yoke. The city yielded to the allied arms, and Charles, afterwards emperor, was proclaimed king. In 1704, Philip, aided by the French, besieged Barcelona in person, and took the fortress of Montjouy; but the English fleet compelled him to raise the siege on the 12th of May. In consequence of the treaty of Utrecht in 1713, Catalonia and the neighbouring provinces resumed their allegiance to Philip V.; but Barcelona refused to join in the universal submission, and in 1714 sustained one of the most memorable sieges that history has to record. Feats of heroism, worthy of the best ages of Rome, and efforts of individual courage, which have perhaps never been surpassed, but by the modern inhabitants of Zaragosa, distinguished that dark and bloody night in which the streets and houses of Barcelona were filled with the mangled bodies of its warriors.—May the same spirit again animate their children, who are at this moment armed for a more arduous struggle, and in a more glorious cause!

The city of Barcelona is defended on one side by the shallowness of the sea, and on the other by numerous bastions, the approaches to which are guarded by many advanced works. Its chief defence, however, is the citadel, which was erected in 1715 at the north-east point, to overawe the inhabitants, and the fort of Montjouy on the top of a mountain at the south-east point. The ramparts, called the sea wall and the land wall, embrace about three-fourths of the town, and form a superb terrace, from which there is a delightful view of the town and the surrounding country. At the end of the land wall is the esplanade, a large open piece of ground turfed and planted with trees, and extending from the new gate to the citadel. A handsome walk through it, about 444 yards long, was finished in 1801.

Though some of the streets of Barcelona are sufficiently spacious, yet, in general, they are narrow and crooked. The town abounds in squares, which are small and irregular. The largest of them is
spacious and elegant, decorated on one side by
governor's palace, on the opposite side by th
change, on the other by the sea gate and the cu
house, and on the north by a row of good h
The architecture of the houses is, in general, ple
and simple; they are about four or five stories
having large windows with balconies. Most o
houses which have been built within the last
years, have their fronts adorned with paintings in f

The public buildings of Barcelona are re
able, both on account of their external bea
the curiosities which they contain. The
church, about 160 feet long, and 62 br
magnificent appearance. Twelve large
lars separate the nave and aisles, and
clusters of columns of various sizes.
gon dome of Gothic architecture,
leries, stands in the middle of the
choir and the great door. Th
stands over the subterranean c
relics of St Eulalia, is forme
ing a semicircle, which c
in the Gothic style, and of ex
The convent of La Merci has a larg
Doric portal, and a fine front compose
ries of Corinthian and Ionic architecture.
cloister, which is sixty feet square, is most sup
executed. The portico, of sixteen arcades,
surrounds it, is supported by twenty Doric col
of marble. Above the portico is a spacious gal
which has, on the outside, thirty-two arcade
Ionic columns of marble, ornamented with a b
trade of grey marble. The convent of St Fran
has a large and handsome Gothic church, and a
ter, adorned with paintings. The convent o
Dominicans, and the chapel of St Raymond,
scarcely deserving of notice. The chapel of
Lady of the Rosary, has two cloisters, one of w
has its walls covered with paintings, put up b
Inquisition, in 1745, to preserve the memory o
numerous victims of that bloody tribunal. B
writhing in the midst of flames; devils runnin
with bodies; and inscriptions containing the
signation and punishment of the culprits, attrac
notice of strangers. Above one of the doors o
cloister is a large inscription, stating, that the m
ments of the punishment of those who were cond
ed were formerly deposited there; but that th
vages of time and of war had destroyed these
cious relics, and induced the inquisition to perpe
their remembrance upon canvass. The parish ch
of St Mary of the Sea, built in the fifteenth cen
is the finest in Barcelona. The principal altar
rich assemblage of white, black, and mixed ma
The Hotel-de-ville contains a variety of excellent
ces of sculpture. The hotel of the Deputa
where the States of Catalonia assembled, is reck
one of the handsomest edifices in the city, and
tains the archives and charters of the crown of
ragon. The palace of the Counts of Barcelona
the Kings of Arragon, distinguished by the
simplicity of its architecture, serves for the priso
the inquisition, and the academy of medicine. Th
vernor's palace was built, in 1444, as a marke

It was converted into an arsenal in
2, Philip IV. made it the residence of
f Catalonia. The exchange is a
g, 230 feet long and 77 wide, and
d majestic appearance. The cust
atre, and the school for surgery, are
buildings deserving of notice. Be
buildings, there are six hospitals,
and an asylum. The poor employ
amounts to 1400, of which 300
The university of Barcelona was
beginning of the tenth century, by
now turned into barracks. Besides
ion of natural curiosities, and two
, there are four academies, viz.
phy, history, practical medicine,
ce.

remains of those superb buildings,
mans decorated Barcelona, have al
shed. The only antiquities which
, are, 1. The remains of a Mosaic
sed of white and blue stones, repre
tons. 2. A lofty and massy arch of an
wh ch seems to have conveyed water from the
in of Colserola. 3. A basin of white marble
house of the archdeacon near the cathedral,
its front covered with reliefs. 4. Six large
columns, with capitals of the Corinthian or-
These columns, which are 29 feet 10 lines
orm part of the walls of a house. 5. Several
pieces of sculptures in the court walls of a
belonging to the Pinos, in the square of Cu-
. Among these, there is a little statue of
is, without the head, of beautiful workman-

festivals and ceremonies of the church are
larly brilliant at Barcelona. Those which
ace during the holy week are the most remark-
nd some idea of their grandeur may be formed
he immense quantity of wax which is then con-
In the three processions there are burned
30,000 flambeauxs of white wax, each of
weighs about five or six pounds. Though
eater part of this wax comes from Africa, it
a great branch of trade and industry.

harbour of Barcelona is formed by a kind of
ituated between the citadel of Montjouy and
y. At the beginning of the sixteenth century
merely an open coast, with considerable depth
er. At present it is only a great basin, form-
piers, and kept up by solid quays. Notwith-
g the exertions which are made to keep it
the basin is gradually filling up with sand.
of any considerable size cannot at present be
ed, and frigates cannot come within half a
of it. The entrance to the harbour is diffi-
nd occasionally dangerous, in consequence of
bar formed at the place where the waters of
zos and the Llobregat mingle in the sea. The
r of Barcelona, notwithstanding these disad-
es, is secure and well-sheltered, and is always
d with the ships of different nations. A few
go, the total number of vessels, in one year,
0 Spanish, 150 English, 60 Danes, 45 Dutch,

r his
ed
n

for the
vince amount
700,000 pair of
ported to Spain, India, and
America.

Between the 13th and 16th centuries,
of woollen, linen, silk, cotton, and hemp,
factured in Barcelona. After a long
activity, its manufactures revived about
of the 18th century, and are now flourishing
all former example. The principal articles
ed calicoes, silk, silk stockings, ribbons,
galloons. No fewer than 214 manufactories are em-
ployed on printed cottons, 524 looms on silk stuffs,
and 2700 looms on ribbons and silk galloons. The
articles manufactured from silk are, taffetas, twilled
and common silks, satins, and velvets. Besides these
articles, laces, blonds, network, and tapes, are manufactured to such an extent as to occupy about 12,000 persons. Galloons, laces, gold and silver fringes, and silk gold and silver embroideries, are likewise made. Among the manufactories recently established are, several for hats, two for stained paper, one for gauzes like blond lace, one for glass, one for cotton stuffs, and a magnificent establishment for the foundery of cannon. Cotton spinning was introduced about the year 1790, and it employs about 4000 looms, and 10,700 persons. No less than 120,700 pieces, or 2,896,871 French ells of cotton stuffs of various kinds, are annually manufactured, to the value of £242,510 sterling.

The climate of Barcelona does not seem to be so mild as was formerly believed. The air is constantly charged with humidity, and the east winds are very prevalent. Formerly snow never fell at Barcelona, but at present it snows every year. The spring is always the worst season of the year. The intense heat of summer is moderated by the east wind; and the changes of temperature are both great and sudden. Autumn is the most delightful season.

Barclays

told him, I understood from Scotland, that, notwithstanding Lauderdale was there, and had promised to do something before he went, yet our friends' bonds were rather increased; and that there was only one thing to be done, which I desired of him, and that
s, to write effectually to the Duke of Lauderdale
that style wherein Lauderdale might understand
he was serious in the business, and did really in-
thing he did write concerning, should take
hich I knew he might do, and I supposed
night answer; which if he would do, I
edge as a great kindness. But if he did
that manner, so that the other might
to be serious, I would rather he
lf the trouble; desiring withal to
er of dealing, as being different
oliciting: all which he seem-
nd said he would write as I
turned to Ury, and was
ercise of his religion un-
er 1679, when he was
leen, as well as seve-
lischarged in a few
d by the magis-

widely cir-
ly assailed
rism the
form-
doc-
ngs

Barcelonetta, Barclay.

The following is an accurate statement of the population of Barcelona, including Barcelonetta:

In 1715	37,000
1769	54,000
1787	111,410
1798	130,000
1806	160,000

The number of families amounts to 20,508, the number of houses to 10,767, the churches to 82, and the convents to 50. East Long. 2° 13′, North Lat. 41° 26′. See Laborde's *View of Spain*, vol. i. p. 27. Bourgoing's *Travels in Spain*, chap. xxxiii. Townsend's *Travels*, vol. ii. p. 374. Reichard, *Guide des Voyageurs en Europe*, vol. i. p. 79; and *A Tour in Spain and Portugal in* 1803, chap. i. published in Philips' *Voyages and Travels*, vol. iii. See also CATALONIA, where we shall give a full view of the trade of that flourishing province, as communicated to the editor by a gentleman who has resided in that country. (*π*)

BARCELONETTA, the name of a new town adjacent to Barcelona. It is situated to the south-east of the city, between the sea-gate and the light-house on the mole, and was built about the middle of the eighteenth century. It is a complete square, with twenty-four regular streets, each about twenty-five feet broad. Fifteen of these are direct and parallel, and are intersected at equal distances by nine streets. The houses, which are built of brick, are all one story high, and of the same height and width in front. The uniformity of the streets are a little varied by two squares. The inhabitants are chiefly soldiers, sailors, and people connected with the navy. Population 13,000. (*π*)

BARCLAY, ROBERT, of Ury, generally known by the title of the APOLOGIST, was the eldest son of Colonel David Barclay, and descended through a long line of ancestry from Theobald De Berkely, who lived in the time of David I. He was born on the 28th December 1648, at Gordonston, in Morayshire, the seat of his maternal grandfather. After being educated in the best schools in Scotland, he was sent to Paris, and placed under the tuition of his uncle, who was rector of the Scots college. He gave early presages of great genius, and acquired much proficiency in all the learned sciences and elegant accomplishments of the times. He soon became conspicuous in the college; and was particularly noticed for his vivacity and acuteness in the public disputations of that seminary, where he gained many prizes. His uncle admired his talents, and offered to leave all his fortune to him, which was very considerable, if he would remain in France; but his mother, on her death-bed, had strongly enjoined his removal from the college, lest he should imbibe the errors of popery. In obedience to parental authority, he returned home in 1664, and thus lost his uncle's fortune and favour to gratify his father's conscientious compliance with the prejudiced, but pious notions of his mother. Though destitute of wealth, he possessed what was more valuable; for his mind was deeply fraught with the riches of learning and literature.

Soon after his return to Scotland, he joined the society called Quakers, and became their greatest ornament and ablest advocate. Previous,
his embracing the opinions of that sect
his friends of all religious persuasions to
doctrines, that he might adopt a system
responding to the truths of the gospel,
viction alone, as we are informed, he w
his choice.

In the year 1670, he was married to C
lison, of the family of Lachintully, the g
ter of the celebrated Colonel Molison, w
signalised himself in the defence of Ca
the Turks. And about this time, he fi
as an author, by a work, entitled, *Tru
Calumnies*, which is an answer to *A Dial
a Quaker and a stable Christian*, written
Mitchell a preacher, and printed at Aberd
controversy then subsisted between th
Aberdeen and the Quakers, relative to t
of the latter, which warmly interesting B
ed forth his talents as a polemical writer
same year he published a postscript in
questions. Mitchell replied to *Truth cle
lumnies*, and our author again answere
work entitled, *William Mitchell umma*
was published in 1672. In this controve
Barclay discovers his variety of learning,
was well acquainted with ecclesiastical h
above all, he shows, with how much ju
dexterity he could apply his knowledge
of his religious opinions.

In 1673, he published *A Catechism an
of Faith*, which is an exposition of the d
principles of the Quakers, supported b
to Scripture testimony. His next publi
Theses Theologicæ, which were address
clergy of what sort soever," and con
propositions, on which he gives his sent
explains them in conformity to the prin
sect. He vindicated the Theses from t
of Nicholas Arnold, professor in the u
Franequer in Friesland, by a Latin treatis
Amsterdam in 1675. In the same year h
an account of a disputation between the
divinity of the university of Aberdeen a
kers, in which he bore a conspicuous p
seems to have terminated without sat
either party. The students also published
of this conference in a pamphlet entitled,
Canvassed, which occasioned a reply, en
kerism Confirmed, in two parts, both
1676.

Previous to this time, he generally resi
with his father; but in this year he went
and from thence to Holland, accompanied
Penn, the celebrated proprietor of the
Pennsylvania. These religious men trave
land and Germany, visiting their friends,
nating their doctrines. They waited upon
princess palatine of the Rhine, at her
Herwerden, and were kindly received. S
have adopted their opinions, for she openl
the Quakers; but her friendship for Barc
cere and unfeigned, and lasted during lif
quently wrote to him with her own ha
ways promoted his views at the court of

far as her influence could be of service to him or his friends. When he returned to London, he learned that his father and other Quakers were imprisoned in Aberdeen for holding meetings in that city. He therefore presented a memorial in their behalf to Charles II., which was delivered by himself into the king's own hand, who caused his Secretary of State, the Duke of Lauderdale, to underwrite upon it a favourable reference to the council of Scotland, which had the desired effect, as they soon after obtained their liberty.

In this year (1676) he published "*The Apology of true Christian Divinity*," in Latin, at Amsterdam, which is the most celebrated of his works. It is dedicated to King Charles the II. The dedication is remarkable for the freedom and boldness of sentiment and language in which his majesty is addressed. "Thou hast tasted," he says, "of prosperity and adversity. Thou knowest what it is to be banished thy native country; to be overruled, as well as to rule and sit upon the throne; and being oppressed, thou hast reason to know how hateful the oppressor is both to God and man. If, after all these warnings, and advertisements, thou dost not turn to the Lord with all thy heart, but forget Him who remembered thee in thy distress, and give up thyself to folly, lust, and vanity; surely great will be thy condemnation." "*The Apology*" is reared on the "*Theses Theologicæ*," being an exposition of the fifteen propositions contained in that work. The author's general plan is, to state the position he means to establish, and to support it by scripture quotations applicable to the case, or to deduce the truth of it by an argument in the form of a syllogism. By this learned work he acquired great celebrity, as a deep theologian, profoundly skilled in the scriptures, the fathers, and church history. His next publication, which also appeared this year, is entitled, the "*Anarchy of the Ranters*," and it is a vindication of the society from the imputation of disorderly parties in their discipline, of which they were accused by their adversaries.

About the end of September, the Apologist returned to Ury; and although he had obtained his father's release from confinement, he was not able to protect himself. On the 7th November 1676, he was committed to prison in Aberdeen along with several other Quakers, for holding meetings for public worship; and did not regain his liberty until the 9th April 1677. While in prison he wrote a treatise entitled, "*Universal Love considered and established upon its right foundation*," which was published after his release.

He left Ury in May, and went to London to exert himself for the deliverance of the Quakers of the north, who were still harassed by imprisonment and fines, for holding meetings at Aberdeen in contravention, as it was alleged, of a statute enacted against *armed field conventicles*; which evidently did not apply to these peaceable people. From *Theobald's near London*, he wrote to the Princess Palatine on this subject, in which he gives an account of a conversation that had passed between him and the Duke of York relative to the sufferings of the Quakers. It appears by this letter, that he had addressed his Royal Highness in very plain language, for he says, "I told him, I understood from Scotland, that, notwithstanding Lauderdale was there, and had promised to do something before he went, yet our friends' bonds were rather increased; and that there was only one thing to be done, which I desired of him, and that was, to write effectually to the Duke of Lauderdale in that style wherein Lauderdale might understand that he was serious in the business, and did really intend the thing he did write concerning, should take effect; which I knew he might do, and I supposed the other might answer; which if he would do, I must acknowledge as a great kindness. But if he did write and not in that manner, so that the other might not suppose him to be serious, I would rather he would excuse himself the trouble; desiring withal to excuse my plain manner of dealing, as being different from the court way of soliciting: all which he seemed to take in good part, and said he would write as I desired." He soon after returned to Ury, and was permitted to enjoy the full exercise of his religion unmolested, until the 9th November 1679, when he was taken out of a meeting at Aberdeen, as well as several of his friends; but they were discharged in a few hours, and never afterwards disturbed by the magistrate.

"The Apology," which had become widely circulated in six different languages, was rudely assailed by John Brown, in a work entitled, "*Quakerism the Pathway to Paganism*." To this abusive performance, Barclay replied in vindication of his doctrines, which is the last of his polemical writings that are published. From this period, he was occupied, for the most part, in travelling in England, relative to the concerns of the society; and when in London, in 1682, he was honoured with a public appointment, having received a commission as governor of East Jersy in America. An extensive tract of land in that province was, at the same time, granted to him and his heirs in fee. Charles II. confirmed his government for life, and the commission is expressed in terms highly flattering to this good man: "Such are his known fidelity and capacity," it says, "that he has the government during life; but that every governor after him shall have it for three years only." He was authorised to appoint a deputy-governor, with a salary of £400 sterling per annum; and Gawn Laurie, a merchant in London, was accordingly appointed to that office. Having arranged these matters, he returned to Ury: but in summer 1683, he again visited his friends in London. Towards the close of that year, however, he came home, and occupied himself in shipping stores, provisions, and other necessaries, from Aberdeen to the colony of East Jersy; in the prosperity of which, he was extremely interested.

In 1685 he went again to London relative to the concerns of the society; but he soon returned, and remained at home until April 1687, when, at the earnest solicitation of George Fox, and other friends, he set off for court, to exert his influence in behalf of the Quakers. As the king honoured him with his friendship, he had access to his majesty at all times; and, on this occasion, he presented an Address from the Quakers in Scotland, expressive of their gratitude for his majesty's proclamation permitting liberty of conscience; which was graciously received. The apologist seems to have stood on a footing of great intimacy with the king, and to have conversed with him candidly and freely on the business of the state. Considering the intricacy of his majesty's affairs at that time, the opinion or advice of a sincere and honest, yet clear-headed man, was no doubt highly valued by James. Having accomplished in London the object of his journey, he returned home.

In November 1688 he was again in London, and embraced that opportunity to take leave of his majesty, with whose misfortunes he was greatly affected. At his last interview with the king, while they were standing at a window in the palace, conversing together, James looked out and said, "The wind is fair to bring over the Prince of Orange;"—the apologist remarked, "It was hard that no expedient could be fallen upon to satisfy the people."—His majesty replied, "He would do any thing becoming a gentleman, but never would part with his liberty of conscience." This sentiment was so consonant to the apologist's mind, and corresponded so closely with his own principles and practice, that it drew forth his approbation; and with mutual regret they parted to meet no more.

In the month of December he arrived at Ury, and lived retired for nearly two years, enjoying domestic happiness in the bosom of his family. But having gone to Aberdeen about the end of September 1690, to attend a meeting of Quakers, he caught cold while returning to Ury, and being seized with a fever, it put a period to his life on the 3d of October, after a short but severe illness.

With a mind naturally strong and vigorous, he possessed all the advantages of a regular and classical education; and his writings evidently show the profundity of his research, as well as the extent and variety of his learning. His mild temper, benevolent heart, and sprightly conversation, gave him influence with men in elevated stations; but he employed it only for the benefit of his friends, and often successfully exerted himself in behalf of others, as well as for the members of the society to which he belonged, from motives of pure benevolence. If, on one occasion, he inconsiderately betrayed a fervour of zeal in his profession of a preacher, by exposing himself in sackcloth on the streets of Aberdeen, in the year 1672, we must concede to him, at least, the merit of sincerity; and, in justice, make every allowance for the ardour of a youthful mind. Although his feelings were warm, yet his passions were subdued by strict discipline; and the practical observance of the rules of moral duty strengthened and invigorated every virtuous sentiment. Cheerful, yet serene, he withstood the shocks of a chequered life with fortitude and firmness. Ever active and indefatigable, he composed one of his best works within the walls of a prison; and, in all situations, he was constantly occupied with that which he conceived to be for the good of mankind. Considering the shortness of his life, and the time he employed in travelling, it is astonishing that he could write so much, and so well. But his works have outlived him; and, in three volumes, the scattered opinions of the society to which he belonged are collected, arranged, and exhibited to the whole world in elegant uniformity; and throughout Europe and America, "The Apology for true Christian Divinity" is to be found in the libraries of the wise and learned. See two Manuscripts preserved in the Library of Ury, and the author's printed *Works*. (T)

BARD, a professional poet and musician of ancient times, whose office it was to celebrate, in song, the mighty deeds of the heroes of his nation, or to lament, in pathetic strains, their untimely loss, or any great public calamity. The term, according to Festus and Cambden, is pure British or Celtic, and denotes a *singer*. The Celtic bards were a particular class of the Druids, or ministers of the national religion; but, taken in its more general acceptation, the term bard denotes any professed musician and poet, or minstrel, of ancient times.

We have very satisfactory evidence, that, during the heroic ages of Greece, the profession of a minstrel, or bard, was in the highest esteem. Homer makes honourable mention of Thamyris and Tiresias, two celebrated bards of those ages: and he describes, as one of the highest gratifications at the court of King Alcinous, the bard Demodocus, pouring forth, to the sound of the lyre, his lofty strains. Phemius, another bard, is introduced by Homer, as deprecating the wrath of Ulysses, in the following terms:

> "O king! to mercy be thy soul inclined,
> And spare the poet's ever gentle kind:
> A deed like this, thy future fame would wrong;
> For dear to gods and men is sacred song." ODYSS. [illegible]

It can scarcely be considered as derogatory to th[illegible] divine poet himself, to enrol him among a class [illegible] men anciently so highly honoured, if, as is justly h[illegible] due, we place him foremost in the list of all the [illegible]lebrated bards of antiquity.

Among the ancient Scandinavians and Germa[illegible] the recital of martial deeds, by the bards or minstre[illegible] was a gratification which was very highly priz[illegible] Such recitals, according to Tacitus, inflamed t[illegible] courage of the ancient Germans, and served them [illegible] omens of future warfare. Nor was it so much [illegible] the charms of harmony, as by the display of herois[illegible] that the hearers were delighted; for, according [illegible] that author, a harshness of tone was affected, a[illegible] the voice was rendered deeper, and more resoundi[illegible] by the application of a shield to the mouth of t[illegible] bard. "*Sunt illis hæc quoque carmina quorum* [illegible] *latio quem barditum vocant, accendunt animos,* [illegible] *turæque pugnæ fortunam ipso cantu augurantur; t*[illegible] *rent enim, trepidantve, prout sonuit acies. Nec t*[illegible] *vocis ille quam virtutis concentus videtur. Affecta*[illegible] *præcipue asperitas soni, et fractum murmur obje*[illegible] *ad os scutis, quo plenior et gravior vox repercu*[illegible] *intumescat.*" De Mor. Germ.

With respect to the honour in which the ancie[illegible] inhabitants of Scandinavia held their bards, or *scal*[illegible] as they were there denominated, we have the m[illegible] ample testimony in their old chronicles. From th[illegible] it appears, that the kings of Denmark, Sweden, a[illegible] Norway, were constantly attended by their scalds [illegible] scalders, who were always treated with the highe[illegible] respect. Harold Harfager placed these minstre[illegible] which it assumed, in order that its members might assemble in secret, and unsuspected. The term *ovyz*, or *ovate*; by which the third class of bards was distinguished, has the meaning of artisan or mason; and the free-masons preserve a traditionary memorial of their meeting anciently on the tops of the highest hills, and in the bottoms of the deepest vallies, and when the sun was in its due meridian.

It was the cruel policy of Edward I. to command a general massacre of the Welsh bards, persuaded that nothing was more likely to maintain among the people a sentiment of military valour, and a passion for national independence, than the traditionary legends of this class of men, who, like the ancient Tyrtæus, employed their animated strains, as a means of exciting the courage of their countrymen against the common enemy. The system of bardism, however, recovered much of its ancient vigour in Wales, during the short, but spirited, insurrection of Owen Glendower. But when that effort for restoring the independence of the country was crushed, the bards were again proscribed and persecuted. They, however, again made their appearance, as the genealogists and minstrels of the great Welsh chieftains; a capacity in which they have enjoyed great honour and emolument, in every country where tradition was not entirely superseded by the general diffusion of letters. In Ireland, and in Scotland, every great family was possessed of its bard, almost down to the present day. In the Highlands of Scotland, particularly, every *regulus* or chieftain had his family bard, who was regarded as filling a very important office, and who had lands assigned him, which descended regularly to his posterity.

The bards of ancient times do not appear to have been so highly honoured, or so liberally remunerated. We read, that Alexander the Great was accompanied, in his expedition to India, by a poet, or bard, named Cherylus, who proposed to the hero to celebrate, in song, his mighty exploits. Alexander permitted him, only on condition, that the poet should receive a piece of gold for every good verse, and a blow for every bad one. The scholiast Horace, to whom we are indebted for this anecdote, adds, that the unfortunate minstrel was beaten almost to death, in consequence of this singular convention.

The khalifs, and other princes of the East, appear to have had their bards, as well as the nations of the North, and the ancient Greeks. There are bards, too, in the Ladrone islands, and among other savage tribes, according to the testimony of different voyagers. Sir John Mandeville, who travelled into the Levant in 1340, relates, that when the Emperor of Cathay, or the grand Khan of Tartary, is at table, with the great men of his court, no one is courageous enough to address him, except his minstrels, whose office it is to amuse him. The same traveller adds, that these musicians of the court are considered as officers of distinguished rank. Leo Africanus also makes mention of poets of the court whom he found at Bagdad about the year 990. The institution of bards, therefore, may be said to have prevailed in almost every country of the world.

Though we may presume, that the ancient Britons of the southern parts of our island had originally as fine a taste and genius for poetry as those of the north, yet few or none of their poetical compositions have been preserved, or descended to our own times. This is to be accounted for, by the repeated conquests to which this part of our island was subjected by the Romans, Saxons, and Normans. But in the mountains of Wales, and of Scotland, where the aboriginal Celts were permitted to retain undisturbed possession of their territory, the native taste for minstrelsy flourished without interruption; and gave birth to numerous productions, which time has spared even to the present day. Nennius, who wrote in the ninth century, in the reign of Prince Mervya, makes honourable mention of several of the Cambrian bards. He says, that Talhairan was famous for his verses; as also, Aneurin, Taliessin, Llywarch-hen, and Chian, who flourished in the sixth century. Of these bards, the compositions of three are still extant; viz. Aneurin, Taliessin, and Llywarch-hen. The minstrels of Scotland were not less celebrated in their day, insomuch, that it stamped reputation upon a proficient in this art to say, "that he came out of the *North countrie*." A great number of beautiful ballads, which we may reasonably conclude to have been the production of these ancient poets, have descended to our times; but, in most cases, the name of the poet has perished. To this, however, there is one very illustrious exception, in the case of the poems ascribed to Ossian, the son of Fingal, who is said to have reigned over a district of the Highlands of Scotland, in the second or third century. If we admit these poems to be genuine, or to have received but a few modern additions and embellishments, they are calculated to give us a very exalted idea of the powers and conceptions of the ancient bards. It is not in this place that we propose to discuss the much agitated question, of the authenticity of these poems; but there is one remark upon the subject, made by Warton, which may, without impropriety, be here introduced. "Notwithstanding," says that author, "the difference between the Gothic and the Celtic rituals, the poems of Ossian contain many visible vestiges of Scandinavian superstition. The allusions in these poems to spirits who preside over the different parts, and direct the various operations of nature; who send storms over the deep, and rejoice in the shrieks of the shipwrecked mariners; who call down lightning to blast the forest, or cleave the rock, and diffuse irresistible pestilence among the people, beautifully conducted and heightened under the skilful hand of a master bard, entirely correspond with the Runic system, and breathe the spirit of its poetry." *Hist. of Eng. Poetry*, vol. i. diss. 1.

As letters have become generally diffused, the institution of bardism has sunk in dignity, and become corrupted; the exercise of this profession having become less necessary or important. It is, however, but a very few years since the Highland chieftains ceased to have family bards; and there are still respectable remains of this institution in Ireland and in Wales. After the reign of Henry VII. the British bards seem to have degenerated into troops of strolling minstrels and play-actors, disgraced by the meanness of their conduct, and the licence of their man-

uch, that it was found necessary to enact
er to restrain their irregularities. A cu-
of Queen Elizabeth, of the year 1567,
degraded condition in which the bards
period. It premises, that "having found
er of pretended minstrels, rhymers, and
the practice of molesting the inhabitants
nd hindering the expert minstrels, rhym-
sicians, from executing their profession,
ng it; willing, therefore, to rectify this
knowing that Sir William Mostyn, and
, have enjoyed the gift of poetry, and of
he silver harp; therefore, we enjoin you,
ey, Squire Griffith, Ellis Price, and Sir
stryn, to assemble on the first Monday
ast of Trinity; to choose out the best
the principality of Wales, and to remit
o till the ground, or to exercise necessary
.

tion as these minstrels lost their respect-
consideration, their compositions sunk in
became as degraded as their persons or
rs. See Evans *de Bardis*. Warton's
g. *Poetry*. Jones' *Relics of the Welsh*
ard's *Melanges de Liter.* vol. ii. (*m*)

E, or Barrege, a village in France, in
ent of the Higher Pyrenees, celebrated
mal waters. The temperatures of the
rings at Barege differ considerably from
The lowest is 73° of Fahrenheit, and
about 120°. These waters contain sul-
ydrogen, united to a small quantity of
e common salt, and a small quantity of
inous matter. The specific gravity of
a little greater than that of distilled wa-
rders of the stomach, in affections of the
ns, and in the resolution of indolent tu-
waters of Barege have been found of
tage. The waters are carried to a great
d preserved for a long time, though not
ng some of their medical virtues. East
30", North Lat. 42° 53'. See Saunders
Waters, and Rutty's *Methodical Synop-*
al Waters. (*j*)

TH, Bareuth, or Bayreuth, is the
e ancient margraviate of Bareith, a prin-
he circle of Franconia. It is situated be-
hree rivers Mein, Mistelbach, and Sendel-
frontiers of the new kingdom of Bavaria.
viate of Bareith was annexed to the king-
ssia in 1782, and in the year 1801 it sup-
pulation of 205,440. The town of Ba-
presents nothing interesting to the eye
er, was formerly the seat of numerous
s. Population 10,000. East Long. 11°
Lat. 49° 55'. See Keysler's *Travels*,
xc. 345; and Peuchet's *Dict. de la Geog.*
(*π*)

he Barium of the ancients, is a sea-port
ples, and capital of the province of Bari.
ants employ themselves partly in fishing,
anufacture of glass, linens, and cottons.
e, which contains about 695,278 English
population of 281,048, produces corn,
tton, saffron, and fruits. According to
Chantreaux, the population of the town is 30,000; but the estimation of Swinburne, who makes it only 6000, is probably more correct. East Long. 16° 52', North Lat. 41° 15'. See Swinburne's *Travels*, vol. ii. p. 1. (*j*)

Barilla || Barley Mill.

BARILLA, the name under which the impure carbonat of soda is imported from the coasts of Spain and other ports of the Mediterranean. See Soda. (*w*)

BARK. See Tanning.

BARK, Peruvian. See Materia Medica.

BARKING, a market-town of England, in the county of Essex, situated on the small river Rhodding, and on a creek that leads to the Thames. The chief inhabitants of the town are fishermen, who contribute to the supply of the London fish-market. At a short distance from the town, towards Dagenham, stands an old house, where the gunpowder plot is said to have been hatched. Population, 2182. Number of houses, 419. See Lyson's *Environs of London*, and Morants' *History of Essex*. (*w*)

BARLESIA, a genus of plants of the class Didynamia, and order Angiospermia. See Botany. (*w*)

BARLETTA, a sea-port town of Naples, in the province of Bari, whose ruinous exterior, and thin population, form a striking contrast with its interior magnificence. The houses are large and lofty, and the streets spacious and well paved. The antique granite columns of the cathedral, and the colossal statue in the market-place, which is seventeen feet three inches high, and is supposed to represent the emperor Heraclius, are among the principal curiosities of the town. The harbour, which is commanded by the citadel, consists of several irregular piers, but affords no shelter for shipping. The exports of the town are corn, almonds, salt, and liquorice which grows in the swamps without cultivation. East Long. 16° 20', North Lat. 41° 19'. See Swinburne's *Travels*, vol. i. p. 275. (*π*)

BARLEY. See Agriculture *Index*.

BARLEY Mill, the name of a machine for taking the husks from barley.

Plate LIII. Fig. 1.

A barley mill of the most improved construction is represented in Figure 1. of Plate LIII. The water wheel A is eighteen feet six inches diameter and carries fifty buckets, each of which is three feet three inches wide. On the water shaft B, that carries the water wheel, is fixed the spur wheel C, which is eighteen feet diameter, reckoning from the pitch stroke, and has 340 teeth. The spur wheel C impels the pinion D of thirty-two teeth and one foot 8.4 inches diameter, fixed upon one extremity of the shaft E, while the other extremity carries the wheel F of 150 cogs and seven feet 11.45 inches diameter to the pitch stroke. The wheel F drives the pinion G, fixed on the stone spindle H, and having a diameter of four feet six inches. The spindle H carries the millstone I, which is four feet six inches in diameter, and one foot five inches thick, and which performs 280 revolutions in a minute.

The wheel K, of fifty teeth and two feet diameter, impels the wheel L of the same number of teeth and diameter, which is fixed upon the spindle R. On the spindle R is a conical place, upon which the pinion M of twenty-five teeth and one foot diameter, is fixed by means of a brass bush fitted into the centre of the pinion, and then bored exactly to fit the cone in the spindle R. Below the base of the cone is a brass ring 3, to keep the pinion M firm upon the cone, by means of four screw-bolts, which bring the pinion firmer to the base of the cone. On the other side of the pinion are two projections 1, 1, commonly called snugs, which take into similar projections on the end of the catch 2, 5. This catch slides along the spindle R by moving the lever N, but goes round with the spindle by means of two tongues fixed on the opposite sides of the spindle, one of which is partly visible at 4 in the Figure. Two grooves are cut on the inside of the catch, to admit the tongues, in order to carry the catch round with the spindle. The wheel NO, having 102 teeth, and a diameter of four feet $1\frac{1}{2}$ inches to the pitch stroke, is screwed to the side of the hoops or cases that inclose the stone. These hoops, a section of which is represented by *a*, *b*, *c*, *d*, are made in two parts, and screwed together by four bolts 6, 6, 6, 6. They are lined with milled iron, pierced into small holes, in order to permit the escape of the dust, and prevent the barley from being carried along by means of the mill-stone.

When the hoops are turned round by the wheels already described, they are supported and kept clear of the stone by the collars *h* and *i*. The collar *h* is larger than *i*, in order to give room to the spout PT to fill the hoops with barley. This is effected by a thin plate of iron *k*, about an inch larger in diameter than the inside of the collar, which is kept close to the side of the collar next the stone by the staple *l* on each side of the stone spindle. The other end of it is kept fast by the cover of the pillow block *m*. In the plate *k*, a hole is cut for the end of the spout PT. When the barley is made, the hoops are stopped by putting the lever N towards *f*: a small sluice which is upon the side of the hoops, as at *a*, *b*, is then opened, and the made barley is allowed to run off into the trough Q. When the hoops are thus emptied, the sluice is shut, and the lever N is brought to *g*. By this means the wheel M engages with the spindle R, by the catch 2, 5, and the sluice X being opened, the hoops are filled with fresh barley. (J. A.)

BARLOW, Thomas, was born at Langhill, in Westmoreland, in the year 1607; and was descended from the ancient family of Barlow-Moore in Lancashire. He received the first elements of his education at the free school of Appleby; and, in the sixteenth year of his age, removed to Queen's College in Oxford, of which he was chosen a fellow in 1633. Two years afterwards, he was appointed metaphysical reader in the university; and his lectures were published in 1637, for the use of the students. In 1652, he was elected head-keeper of the Bodleian Library; and, about the same time, was appointed lecturer of Church-hill, near Budford. In 1657, he was chosen provost of his college; and, after the restoration of Charles II., was nominated one of the commissioners, for reinstating the members, who had been ejected by the parliament in 1648. In 1660, he was admitted Margaret professor of divinity; in the following year was elected archdeacon of Oxford; and in 1675, became bishop of Lincoln. He died at Bugden, in Huntingdonshire, in 1691, in the 85th year of his age. He bequeathed his books partly to the Bodleian Library, and partly to Queen's C Oxford; and all his manuscripts of his own sition to his two domestic chaplains, Willian and Henry Brougham, with a particular requ they should not be made public. The pri his works that have been published, are taphysical Lectures, a Treatise on Tolerat Gunpowder Treason, Advice to a Young Miscellaneous Cases of Conscience, Genuine a variety of letters and pamphlets, but parti number of powerful attacks upon the systen pery. Bishop Barlow was a man of the mo sive literary attainments; intimately acquain the learned languages; eminently skilled in t church history, civil and ecclesiastical law; roughly master of the controversies between testants and Papists. He was entirely ad the Aristotelian philosophy, and keenly h those improvements in physical science, wh introduced by the Royal Society. He wa adherent to the sentiments of Calvin, and a admirer of the school divinity. In his episc racter, he has been justly censured for neve ing in his cathedral and visiting his dioc his political conduct during the troublesom in which he lived, was of the most timo time-serving description. He was possess ever, of many excellent qualities; was ever befriend the learned of every country and d tion; and displayed more just and liberal se on the subject of toleration than any individu time. See *Biog. Britannica*, and *Biog. Dic* Grainger's *Biog. Hist. of England*, vol. iv.

BARMOUTH, a small watering plac county of Merioneth, in North Wales, situ bay of the same name at the mouth of the ri or Avon. The houses of this town are all the bottom and on the declivity of a steep h high water the tide forms an estuary on about a mile broad; but numerous sand ban the entrance hazardous. Great quantities and hose are made here, and no less than 4 of the former, and 10,000 lbs. of the latter, ported from Barmouth in one year. See *Tour in Wales;* and Bingley's *Tour rou* *Wales*. (*j*)

BARNADESIA, a genus of plants of Syngenesia, and order Polygamia Equalis. TANY. (*w*)

BARNARD Castle, a neat and well b of England, in the county of Durham, situat river Tees, and deriving its name from the m castle built here about the year 1178, by Ber liol, upon the summit of a high rock. This formerly celebrated for the manufactory leather breeches, and for tammies or Scotch A number of weavers are still employed i camblets, and the stocking trade is carrie considerable extent. Number of houses, 3 pulation 2966, of which 465 were return ployed in trade. See Hutchinson's *Histor* *ham*, vol. iii. (Q)

BARNAUL, a town of Siberia, situat government of Kolyvan, on the west side of and famous for its silver and copper mines, gold is also found. These mines belong to the crown, and are wrought by 48,000 boors, beside the regular miners. About 686 pood, 16 pounds, and 49 solotniks of pure gold, was produced from these mines from 1745 to 1780. (*j*)

BARNES, JOSHUA, was the son of a tradesman in London, where he was born in the year 1654. He received his grammatical education at Christ's Hospital, and was admitted into Emmanuel College at Cambridge in 1671. He was elected a fellow in 1678; took the degree of bachelor in divinity in 688; and in 1695 was chosen Greek professor in at university. A Mrs Mason, a widow of Hemingford, near St Ives, became a great admirer of his arning; and intimated her purpose of leaving him annuity of £100. "Upon this hint he spake," d secured the widow herself, with a jointure of 200 per annum. He lived about 12 years after his arriage, and died on the 3d of August 1712. He s buried at Hemmingford, where his widow erected a monument to his memory, with a Latin inscrip n, and the following anacreontic lines:

> Βαρνησιος δ' ἄπαντας
> Νικησι πολυτεχνος,
> Λογογραφων φεριστος,
> Ἀνθος τε των Ἀοιδῶν·
> Των Ἱστορων μεγιστος,
> Και Ῥητορων ἀριστος,
> Και Μαντιων βαθιστος
> Βρεταννικης ἀρουρης.

Which are also thus rendered into English:

> Kind Barnes, adorn'd by every muse,
> Each Greek in his own art outdoes:
> No orator was ever greater,
> No poet ever chanted sweeter.
> H'excell'd in grammar mystery,
> And the Black Prince of history:
> And a divine the most profound,
> That ever trod on English ground.

The learning of Barnes was very extensive, and his n remarkably ready and prolific. His principal blications were, a volume of Latin and English ems, most of which were composed during his at ndance at Christ's Hospital, and before he had com eted the 17th year of his age; a poetical para rase of the book of Esther in Greek verse, with a atin translation and Greek notes; a History of Ed ard III., in which he imitates the ancient historians, d puts long elaborate speeches into the mouths of e principal personages; all the works of Euripides, ith a preliminary dissertation on the life and wri ngs of that poet; the works of Anacreon, with a atin translation and notes, a life of the poet, and a issertation on lyric poetry, all dedicated rather pre osterously to the Duke of Marlborough; Homer, ith various tracts and dissertations, and a long Eng sh poem, in which he ascribes the Iliad and Odyssey the pen of Solomon, with a view, it has been sus ected, to induce his wife to assist the more willingly defraying the expense of the publication. He rote a great number of other pieces, which were ne er published; and which consisted chiefly of Greek nd Latin verses on different subjects; the lives of indar, Sophocles, Theocritus, and the Black Prince; an ecclesiastical history from the beginning of the world; sermons, and orations, and critical notes on sacred scripture. He expended much money, and involved himself in considerable difficulties, by the publication of his critical works, few of which produced him much fame or profit in return.

Barnes is admitted to have surpassed most men in the extent of his literary knowledge, to have been full of words, and to have composed in Greek and Latin with wonderful facility; but he wrote with little elegance, and is frequently very deficient in critical judgment. He was so continually quoting from the Greek classics, that he generally went by the name of Greek Barnes. He neither valued nor understood the English language much; and was so little acquainted with the usages of his own country, that it has often been said, he would have been more at home in Athens than in London. He had several enemies, or rather rivals in his literary career, some of whom really envied his acquirements, and unjustly slighted his performances; while others only despised his vanity, or were provoked by the virulence of his censures. He was so remarkable for the compass and quickness of his memory, while his judgment was accounted frequently very deficient, that it has been proposed to add to his epitaph, what Menage said of Pierre Montmaur,

> *Hic jacet Joshua Barnes*
> *Felicissimæ memoriæ*
> *Expectans judicium.*

But, with all his errors as a critic, he will always be respected by the lovers of Anacreon, Euripides, and Homer; while his pedantry as a scholar was counterbalanced by the many excellent qualities, which he possessed as a man. He was ever liberal of his money to serve his friends; and has been known, in the warmth of his charity, to give the coat from his back to a ragged beggar. It is also recorded of him, that he always carried about with him a small pocket bible, which, at his leisure hours, he read over 121 times in the course of his life. See *Biog. Britannica. Biog. Dictionary.* Grainger's *Biog. Hist. of England. Monthly Review*, vol. xiv. (*q*)

BARNSLEY, a small manufacturing town of England, situated on the side of a hill in the West Riding of Yorkshire. A great number of forges are perpetually employed in manufacturing iron wire, nails, and hardware. There are also several manufactures of linen, cloth, and check, and one for bottles of black glass. The country abounds with coal, stone, timber, and iron ore. Number of houses 710. Population 3606, of whom 1832 were returned as employed in trade. The trade and population of this town have been much increased since its connection with Wakefield and Rotherham, by the canal navigations, and by the rivers Dearne and Dove. (*j*)

BARNSTAPLE, a seaport town of England, in the county of Devon, situated in a fine vale on the eastern bank of the river Taw, over which there is a stone bridge of 16 arches. On account of the shallowness of its harbour, which does not admit vessels of more than 200 tons, a great part of its woollen trade was transferred to Biddeford. Manufactures of baize, however, silk stockings, and waistcoat pieces, Baroach. still employ its inhabitants. Number of houses 619. Population 3478, of whom 578 were returned as employed in trade. See Oldfield's *History of the Boroughs*. (*j*)

BAROACH, BROACH, BAROKIA, or BARUK, the *Barygazah* of the ancients, a town of Hindostan, in the province of Guzerat, situated on a rising ground surrounded with water, on the river Nerbuddah, near the place where it falls into the Gulf of Cambay. A factory was established he
1616 by the English; and in 1683 it had flour
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BAROMETER.

Barometer. History. BAROMETER (compounded of *βαρος weight*, and *μετρον measure*,) is an instrument for determining the weight of the air, and the variations of its pressure in different circumstances. As every change in the weight of that fluid is accompanied with corresponding changes of density, and consequently of its disposition to absorb or deposit moisture, the barometer is also employed to point out the probable changes of weather; hence it is not unfrequently called a *weather-glass*. (See METEOROLOGY.) Another purpose, scarcely less important, to which this instrument has lately been much applied, is the measurement of accessible heights; and the results obtained by means of it approach so near to perfect accuracy, when all circumstances are properly estimated, that this method of determining the heights of mountains is, in many cases, even preferable to the geometrical methods. (See HEIGHTS.) It also appears from the observations of Captain Flinders, that the barometer may be of the most essential service at sea, not only to foretel changes of weather, but also to indicate the vicinity of land. (See WINDS.) These important properties entitle this instrument to a considerable share of our attention.

Before the discovery of the weight of the air, the barometer was entirely unknown; and indeed it was the discovery of that fact, which led to the invention of the instrument. The ancients ascribed to the *horror of a vacuum* all the effects which arise from atmospherical pressure. This explanation, absurd as it may now seem, was admitted even by Galileo; and the ingenuity of a Pascal and a Boyle was scarcely sufficient to point out its futility, and banish it from the established principles of philosophy. The influence of occult qualities, was, in all difficult cases, assumed to explain the phenomena of nature, and it was less inconsistent with their prejudices to ascribe the effects of the weight of the air to an invisible agent, or an unknown principle, than to the operation of a fluid, which they thought was so obviously destitute of all weight. It was accordingly considered as an indisputable fact, that the ascent of water in pumps, and other similar effects of atmospherical pressure, were owing to the horror which nature has for a vacuum. This opinion was universally received till the superintendant of the water works of the Grand Duke of Tuscany, wishing to raise water, by means of a pump, to a considerable height, was surprised to find that the water would not rise higher than 32 or 33 feet. After he had ascertained that this could not be ascribed to any defect in the construction of the pump, he mentioned the circumstance to Galileo, and requested him to give him an explanation of the cause o
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he surface of the water and the mer-
led the upper part of the tube, and
h activity to the horror of a vacuum
to sustain the column of those fluids.
who was then at Rouen, was inform-
ments of the Italian philosophers, he
repeat them; and soon after obtained
It does not appear, however, that
the conclusions which Torricelli had
reflecting on the nature of the expe-
soon convinced that the principle of
vacuum was altogether gratuitous and
that the suspension of the mercury
me other cause. To place the mat-
ispute, he employed tubes of glass 40
aving filled one of them with water,
h wine, he inverted them respectively
se fluids, after the manner of the ex-
rricelli. The water remained suspend-
t of 31 feet 1 inch and 4 lines; and
height of 33 feet 3 inches. These
re performed at Rouen in 1646, in
eral men of science, all of whom were
old opinions. The conviction which
on their minds was complete, and they
nbraced the new doctrines. Pascal
count of the experiments the follow-
work entitled *Experiences nouvelles*
This work was severely attacked,
P. Noel, a Jesuit, who was then rec-
ge of Paris. All the prejudices of a
, and all the virulence of error, were
e attack; and Pascal had the morti-
that many were still disposed to ques-
ions which he had drawn from his ex-

experiment occurred to him which he
ever silence the objections of his op-
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e, is supported by the pressure of the
stand higher or lower according to
the columns of the atmosphere at the
ation; on the contrary, if the weight
no connection with the height of the
ercury ought to stand at the same ele-
ights in the atmosphere. He there-
make the experiment on a large scale;
at the difference between the heights
at the places of observation might be
quantity, he pitched upon the moun-
ne, in the neighbourhood of Clermont,
to his purpose. Being at that time
rote to his brother-in-law Perrier, a
ished talents, who was then going to
esting him to perform the experiment
Various circumstances prevented the
g tried till the 19th of Sept. 1648,
formed with equal accuracy and skill.

The result coincided with the expectations of Pascal: as they ascended the side of the mountain, the mercury gradually subsided in the Torricellian tube; and when they reached the summit, it stood 3 inches 1½ lines lower than at the bottom. The experiment was repeated on different sides of the mountain, and always with a similar result.

Pressure of the air proved by Pascal.

Pascal no sooner was informed of the details of these experiments, than he repeated them on a small scale at the top and bottom of the steeple of St Jacques-la-Boucherie; and he observed a corresponding difference between the heights of the mercurial columns. There now remained no longer any pretext of ascribing the elevation of the mercury in the tube to the horror of a vacuum; for, it would have been absurd to pretend that nature had a greater abhorrence of a vacuum in a valley, than on the top of a mountain; and accordingly all those who were sincerely desirous of discovering the real cause of the phenomenon in question, admitted the conclusions of Pascal concerning the weight of the air, and applauded the simple and decisive method which he had taken to demonstrate its influence. On the whole, the history of this research affords a signal instance of the slow and gradual progress of human knowledge: Galileo proved that the air was possessed of weight; Torricelli conjectured that this fluid caused the ascent of water in pumps, as well as the suspension of the mercury in the tube which bears his name; and Pascal converted this conjecture into a demonstration.

But the triumph of Pascal was too complete not to excite afresh the malignity of his enemies: Descartes, among others, attempted to deprive him of the honour of the discovery of the pressure of the air; and in a letter which he wrote to M. Carcavi, dated June 11, 1649, accuses Pascal of a want of candour, and asserts that he first suggested to him the experiment of Puy-de-dome. Pascal, on the other hand, maintains, in the most solemn manner, that the experiment was entirely his own, and that he never received the smallest hint of it from any person. It would be improper to enter here into the merits of the dispute; but it appears to us, that the pretensions of Descartes are altogether groundless, and that the discovery of atmospherical pressure is due to Pascal alone.

Application of the barometer to the measurement of heights, and meteorological purposes.

It is obvious, from the experiment of Puy-de-dome, that the Torricellian tube, if properly graduated, may be employed to measure the heights of mountains; a purpose, we already mentioned, to which it is now frequently applied. Boyle suggested this application of it in 1665.

After it was ascertained, that the weight of the air was the true cause of the suspension of the mercury in the tube of Torricelli, Perrier continued to make daily observations with it, from the beginning of 1649 to the end of March 1651. One of his friends at Paris, and Descartes, who was then at Stockholm, made similar observations during the same period, and they found, that the column of mercury varied in length, according to the temperature, the winds, the moisture, and other circumstances connected with the state of the atmosphere. Thus the tube of Torricelli became an instrument, not only for shewing the weight of the air, but for pointing out the changes of weather which happen in consequence of variations in the weights of the atmospherical columns. Some pretend that Otto de Guericke first proposed to employ the barometer as a weather-glass; but this idea, so obvious, was a natural consequence of the observations of Perrier and Descartes, and must have occurred at a very early period to these philosophers. Boyle made many meteorological observations with it in 1666; and he was also at great pains to refute a hypothesis advanced by Linus, concerning the cause of the elevation of the mercury in the Torricellian tube. This hypothesis, which prevailed for some time, was called the *Funicular hypothesis:* it assumed, that the mercury was supported by an invisible rope of the same metallic fluid; an opinion so extremely absurd, that, in the present state of science, we have some difficulty in believing that it was ever maintained, or that it should have been deemed worthy of a grave refutation.

The experiment of Torricelli was so simple, and yet so easy to be exhibited under a variety of forms, that a great number of barometers were soon proposed, either with a view of rendering them more correct, or enlarging the extent of the barometrical scale. Before we proceed to give particular descriptions of these instruments, and of the various attempts which have been made to increase their accuracy and sensibility, it may not be improper to make some previous remarks applicable to barometers in general.

General directions for the constructing of barometers.

The tubes intended for barometers ought to be sealed hermetically at both ends, immediately after they are made at the glass-house, and to be kept in that state till they are to be fitted up. Without this precaution, they are apt to be sullied with dust, moisture, and other impurities, which it is almost impossible afterwards to remove, on account of the smallness of their diameters. When they are opened, which may be done with a file, care should be taken not to breathe into them, or to wash them with spirit of wine, or any other fluid; experience having proved, that in tubes so treated, the mercury always stands a little below its proper level. This is, no doubt, owing to the adhesion of a little of the spirit of wine to the sides of the tube, which being afterwards converted into vapour, renders the vacuum above the mercury imperfect. If any cleaning is necessary, it may be done with a fine linen rag, that has previously been well dried.

Tubes.

The tubes ought to be as perfectly cylindrical as possible, though, in some cases, this is not absolutely necessary. They should be about 33 inches in length, and the diameter of their bore should be at least 2 or 2½ lines, otherwise the friction, and capillary action, will be apt to affect the free motion of the mercury. The glass should not be very thick, as it is apt, in that case, to break, when the mercury is boiled in the tube: half a line is sufficient.

[illegible]ry.

The mercury ought to be perfectly pure, and free from all foreign metals. The best is what has been recently revived from cinnabar; the common mercury of the shops being often adulterated intentionally with tin, lead, and bismuth, stands at various heights in the tube, according to the nature and quantity of the foreign substances with which it is amalgamated.

The different mechanical methods which have been proposed for purifying mercury, are, for the most part, ineffectual; we would, therefore, recommend the revivification of the metal from cinnabar, for nice barometers, as being least liable to uncertainty. For this purpose, take a pound of cinnabar, and reduce it to powder; mix it well with five or six ounces of iron, or steel filings; and having put the mixture into an iron retort, expose the whole to the heat of a reverberatory furnace; the mercury will soon pass over in a state of great purity, and may be obtained, by adapting to the retort an earthen receiver which has been previously half filled with water.

Before being introduced into the tube, the mercury ought to be well heated, or even boiled in a glazed earthen pipkin, in order to drive off any moisture which may adhere to it; but this will be unnecessary, if the mercury has been recently revived.

The mercury ought likewise to be boiled in the tube, to expel any air or moisture which may still remain attached to it, or to the inside of the tube. This is done in the following manner: Pour as much mercury into the tube as will make it stand to the height of three or four inches; and introduce a long wire of iron to stir it during the act of boiling. Expose the mercury in the tube gradually to the heat of a chafing dish of burning charcoal; and when it begins to boil, stir it gently with the iron wire to facilitate the disengagement of the bubbles of the air. When the first portion of the mercury has been sufficiently boiled, and all the air extricated, remove the tube from the chafing dish, and allow the whole to cool, taking care not to bring it into contact with any cold substance. Introduce an equal quantity of mercury, and treat it in the same manner, withdrawing the wire a little, so that it may not reach below the upper part of the mercury already freed from air. The chafing dish must also be placed immediately under the mercury which has been last poured in. Repeat the same process with each successive portion of mercury till the tube is filled, always applying the heat very cautiously; and be equally careful in allowing it to cool, before a fresh portion of mercury is poured in.

It sometimes happens, when the tube is carefully inverted, as in the Torricellian experiment, that the mercury, after being completely freed from air, in the way we have described, remains suspended in the upper part of the tube, and does not assume its proper level, with respect to the pressure of the atmosphere, till the tube has been gently shaken. This fact, which seems to have given great difficulty to Huygens, is certainly owing to the capillary attraction of the tube, and the mutual attraction of the particles of mercury, as it takes place only in tubes of a small bore. To say, that it is owing to the influence of an invisible ethereal fluid more subtile than air, is no less unphilosophical than the semicircular hypothesis of Linus, or the principle of the horror of a vacuum, particularly when we can assign a cause for it, of whose operation we have many simple and obvious proofs.

The Torricellian experiment exhibits the barometer under the simplest, though not the most convenient form. The tube AB, (Fig. 2. Plate LIII.) which

LIII. is hermetically sealed at A, ought to be about 33 inches in length, and 2¼ or 3 lines in diameter of bore. Since the height of the mercury in the tube must be reckoned from the surface of the mercury in the bason, the width of the latter ought to be such, that the elevation or depression of the mercury in the tube may have little effect in changing the level of the mercury in the bason. In the more improved barometers, contrivances, which we shall afterwards explain, have been adopted for preserving the lower surface of the mercury at the same level; but this is obtained sufficiently well for common purposes, by giving the bason a considerable diameter with respect to that of the tube.

mon meter. 3. The common barometer, represented in Fig. 3, differs but little from the Torricellian tube. Instead of a bason, a small reservoir is usually attached to the lower extremity of the tube, or rather the tube itself is swelled out into a bulby form, as represented at 4. Fig. 4. In this form, however, the instrument is by no means accurate, particularly when the diameter of the bulb, as is usually the case, differs but little from the diameter of the bore of the tube. In order to keep the surface of the mercury in the bason always at the same level, the father of the late Mr George Adams constructed the bason wholly, or in part, of leather, and by means of a screw at the bottom, adjusted the surface of the mercury in it, so as to have it always at the place from which the divisions on the scale commence.

In this country, the lowest station of the mercury is observed to be about 28 inches, and its highest 31 inches above the level of the mercury in the bason: and when the instrument is to remain in a fixed position near the surface of the earth, we may consider the interval between these two points, as the range of the barometrical scale. The scale which, consequently, will embrace three inches, may be subdivided into smaller divisions, according to the degree of nicety required. Each inch is commonly divided into ten equal parts; and these are subdivided into hundredths of an inch, by a contrivance called a *vernier* scale. (See VERNIER.) By this means the height of the mercury is ascertained, by inspection, to the $\frac{1}{100}$th of an inch. For nice purposes, the vernier may be made to indicate the $\frac{1}{1000}$th of an inch.

Besides these lineal divisions, the scale is divided into other points, having a reference to the instrument in its capacity of indicating the probable state of the weather. At 31 inches, the highest point of the scale of variation, *set fair* is marked on the one side, and *set frost* on the other. At 30 inches, *fair* is written, in like manner, on the one side, and *frost* on the other; and at half an inch below is written the word *changeable*, which answers both for summer and winter.

ble meters. The common barometer answers sufficiently well for most purposes, when the observations are made at the same place; but as many of these necessarily imply a change of situation, it soon became an object of importance to construct barometers in such a manner that they might be conveyed from one place to another without much inconvenience or risk. Barometers of this kind, which are called *portable barometers*, are chiefly employed for measuring heights. They have assumed, under the hands of different artists, a variety of forms.

Derham mentions a portable barometer; but as many circumstances connected with the accuracy of the instrument, are entirely overlooked in its construction, it does not merit a particular description. (*Phil. Trans.* vol. xx. N° 236.) The portable barometer consists, in general, of a tube of the usual length, passing through the upper part of a wooden cistern, to which it is glued, and the bottom of which is made of leather. The tube being filled with mercury, which has been previously well purged of air, and placed in a proper position, the superfluous mercury descends into the cistern, and assumes a level in the tube, corresponding to the weight of the external air. The surface of the mercury in the cistern is adjusted to the same level by a screw, which presses more or less against the flexible leather at the bottom, and raises or depresses it at pleasure. From the line of this level, which is called *zero*, the scale commences, and is reckoned upwards to the height of about 32 inches: the actual divisions of the scale begin at about 15 inches. Various methods have been employed for constructing the portable barometer in a manner best suited to carriage, to placing the tube in a vertical position at the time of observation, to ascertaining the surface of the mercury, and to making allowances for the expansion and contraction of the mercury by changes of temperature: but it will be sufficient to describe the instrument in its present most improved form.

Figures 1, 2, and 3, represent the portable barometer as constructed by Mr Troughton, and first made by him in 1785. The greatest peculiarity in this instrument, according to the opinion of this ingenious and philosophical artist, consists in the excellent manner in which the mercury in the cistern is set to the zero of the scale of inches. For this purpose, a glass cylinder of about 2.5 inches diameter, and as much in length, contains the mercury. An external covering of hollow brass, terminating in a female screw a little above and below the glass, admits male screw pieces, whose ends, well *leathered*, being pressed hard against the ends of the glass, prevent the escape of the fluid. Near the upper end of the brass cover are two slits made horizontally, one before, and the other behind, exactly similar and opposite to each other. At bottom is a screw, seen better in the section Fig. 2. which, acting upon the usual leather bag, forces the quicksilver upwards at pleasure, and, by filling every part, renders the instrument portable. But the primary design of this screw is, to furnish the means of adjusting the surface of the mercury in the glass cistern, so as just to shut out the light from passing between it and the upper edges of the slits in the brass cover. This is the mode of adjusting to *zero*; and it follows, that the upper edges of the slits must represent the beginning of the scale of inches. The frame is entirely made of a brass tube, and above the cistern is of about 1.1 inch diameter. The first ten inches of the lower end is occupied by a thermometer, whose bulb, bent inwards, is concealed within the frame. At about three inches higher, it attaches to the stand by a ring, in which the frame turns

Troughton's portable barometer. Plate LIV. Fig. 1, 2, 3.

Fig. 2.

round with a smooth and steady motion, for the purpose of placing the instrument in the best light for reading off, &c. The actually divided scale commences at about 15 inches above the *zero*, and is continued as high as 33 inches, and, by the usual help of a vernier, is subdivided down to .001 of an inch. A longitudinal slit, from end to end of the divided part, exposes to view the glass tube and mercury within it. The whole of this part consists of two tubes of brass. In the inside of the interior one, slides a cylindrical piece, on which is divided the vernier scale, the index to which is the lower end of the piece. In taking the height of the mercury, this piece is brought down so as just to exclude the light from passing between itself and the spherical surface of the mercury. The screw at top, although but a short one, performs this office in whatever part of the scale the vernier piece may be; for it acts upon the interior long tube, in the inside of which, the piece is sustained by friction; and in which, it is, on every occasion, to be set by hand nearly. The tripod is altogether similar to what Mr Ramsden used for the same purpose, as far back, perhaps, as the year 1775.

PLATE LIV. Fig. 4.

Fig. 5.

It affords, when closed, (Fig 4.) a safe and convenient packing-case for the instrument. The structure of the staff head is curious. The principal part is a circle (Fig. 5.) about .75 of an inch broad, jointed in three pieces: these, although they seem in principle to be incapable of motion, yet, in practice, produce what is fully adequate to the purpose. The three joint-pins extend inwards, so as to pass through a circular rim, which they hold fast: within this rim is hung a similar one by two pivots; and, inside the latter, at right angles to the pivots, are fastened two Y's or angles, in which the barometer hangs by its gudgeons. Thus are brought about, in a small compass, the means of extending the legs, of turning the instrument about respecting the tripod, and an universal joint, whereon it readily places itself perpendicular to the horizon.

Miller and Adie's barometer.

PLATE LIV. Fig. 6.

We shall conclude the account of the portable barometer for the measurement of heights, with the description of one which has lately been constructed by Miller and Adie, uniting the advantages of Troughton's with several important improvements. The general appearance of this instrument, when on its tripod, is nearly the same as that represented in Fig. 3. The scale and vernier are the same as those already described; the top of the tube, which forms the frame, is cut open on the opposite side, so as to allow the finger and thumb to lay hold of the head of the adjusting screw, and is continued beyond it about half an inch; this space is occupied by a circular level, by which the instrument is very conveniently placed in a vertical position. The ball of the attached thermometer is made of a piece of the barometer tube about 1.5 inches long, and bent back so as to lie parallel to the tube of the barometer, with which it is nearly in contact. The mercury in both being thus similarly situated, is equally and simultaneously affected by a change of temperature. The cistern is made of two circular pieces of wood, connected together with leather. Two concentric screws work in the bottom of the external brass cover: the outer screw is intended to raise the whole bottom of the cistern, in order to press the mercury quickly to the top of the tube, either for carriage, or to make room for a considerable descent of the mercurial column. The use of the small central screw is to adjust the surface of the mercury to zero, by pressing a small leather bag in the bottom of the cistern, by which the adjustment is performed more steadily than if the whole area were acted upon. In the top of the cistern is inserted a bit of the barometer tube, about half an inch long, surrounded by a hollow cylinder of ivory, terminating in a female screw, which is stopped by a finger screw of ivory, to prevent the escape of the mercury when the instrument is packed up for carriage. The ivory cylinder has an external covering of brass, whose width is equal to the diameter of the tube that forms the frame of the barometer; both the brass and ivory coverings are cut open on the opposite sides, that the surface of the mercury may be seen through the glass tube, and that the line of light betwixt it and the upper edges of the slits in the brass cover, which is the beginning of the scale, may be distinctly cut off. By this method of adjustment, the upper and under surfaces are observed as nearly as possible under similar circumstances, as to inflection of light, attraction, &c. In this construction, the tube being readily accessible, can easily be cleaned when it is soiled by the mercury, which always happens when the surface of the metal is exposed to the action of the air.

On the top of the tripod is a hollow ball and socket; in the centre of the ball is an universal joint, in which the barometer is hung in Y's; it is then set perpendicular by the level on the top. Four finger screws hold the frame of the barometer steady so as not to be shaken by the wind, or hand, in turning the adjusting screw at the top. When the instrument is placed on uneven ground, so as to require an adjustment beyond the range of the screws, it is brought nearly perpendicular, and to the most advantageous position for observing, by unturning a little the milling forming the upper part of the socket, which must be again pinched. The tube is never removed from the legs of the tripod; to prepare it for carriage, the pivots on which it hangs are lifted out of the Y's and turned a little to one side; and it is then let down until the pivots, which project from the frame about an inch and a half below the top, rest on the ring at the upper opening of the ball. The legs are then closed on it, and held together by brass rings. A brass cap is then screwed on above the joints of the legs, which protects all the upper parts. Two microscopes, for observing the surfaces of the mercury, pack in the lower part of the legs. Fig. [illegible] represents the cistern, and the top of the tube.

When the barometer is to be used at sea, some contrivance is necessary to prevent the oscillations of the mercury. Two methods are employed for this purpose: either to prevent, by mechanical means, the vibrations of the instrument itself, or to check the motions of the mercury in the tube by some peculiarity of form. Both methods may also be conjoined.

One of the earliest marine barometers with which we are acquainted, was suggested by Dr Hooke. It consited of two thermometers, or rather of a ma-

r, (See MANOMETER), and a thermometer
together in the same frame. The thermome-
s affected only by the warmth of the air; the
ieter, acting by the expansion and contraction
ncluded bubble of air, was affected not only
warmth, but also by the weight of the air.
two tubes, therefore, are so graduated as to
with each other when the air is included, it is
, that when they afterwards agree, the pres-
the atmosphere must be the same as when the
s included. And in general, if the thermome-
taken as a standard, the difference of ascent or
t in the other will point out the increase or de-
of the weight of the air. At the same time,
ht to be mentioned, that the condensation and
tion of the air, on which this instrument is al-
er founded, do not depend solely on the weight
atmosphere, but are greatly influenced by tem-
re. Hence this instrument cannot, strictly
ng, be called a barometer, but rather a con-
e for pointing out alterations in the state of
; and as such, according to the observations
Halley, it may be of considerable utility.
g his voyage to the South Sea, he had one of
barometers, and "it never failed," says he,
rognosticate, and give early notice of all the
eather we had, so that I depended thereon,
ade provision accordingly; and from my own
ence, I conclude, that a more useful contrivance
ot for this long time been offered for the be-
f navigation." *Phil. Trans.* 1700-1, Nº 269,
.

Passement obviated the effects of the motions
hip at sea on the barometer, by twisting the
of the tube into a spiral consisting of two con-
ns; by this contrivance, the impulses which
ercury receives, mutually destroy each other,
ing in opposite directions. The effects of the
al and momentary impulses may also be dimi-
by widening the upper part of the tube where
le is applied. The oscillations, which would
y perceptible in the tube, become scarcely sen-
hen they are thus diffused over a larger ex-
surface.

Passement accordingly constructed marine ba-
rs upon this principle; and Mr Nairne, an in-
s artist in London, made one of a similar kind,
ptain Phipps, in his voyage to the north pole.
irne also suspended his instrument on gimbals,
ns of which the effects of the ship's motions
lmost entirely counteracted. M. Zeiher has
ted another marine barometer, depending in
le on the variable elasticity of the air. He
posed a hollow cylinder completely freed from
th two moveable ends; in the inside of the
r, and between the ends, is placed a spring
keeps them separate, and resists the pressure
air, so that the degree of its compression af-
measure of that pressure. When the pres-
the air is increased, the two ends of the cy-
pproach each other; and when it is diminish-
y recede. Consequently the distance between
ill indicate the atmospherical pressure in some
ratio. See *Mem. Acad. Petrop.* 1758 and

Troughton's marine barometer.

We shall conclude the account of marine barometers, with a description of one of the most improved kind as now constructed by Mr Troughton. The tube consists of two parts, joined together about five inches below the top: the bore in the upper part being about $\frac{4}{10}$ of an inch, and in the lower part only $\frac{3}{100}$. By this construction, partly from the difference of the bores, and partly from the greater friction in the lower end, the motion of the mercury is so much retarded, that any impulse given by the ship having a tendency to raise it, will scarcely have produced a sensible effect, before an opposite impulse will be given having a tendency to depress it.

PLATE LIV. Fig. 7.

To counteract more effectually the effects of the ship's motions, the instrument is suspended on gimbals, a representation of which is given at Fig. 7. The whole is attached to the side of the cabin by two tubes of brass, which slide one within the other, and render the instrument capable of being suspended at different distances from the place of support, that the bottom of it may not strike the side of the cabin, during any heavy rolling of the vessel. See Fig. 8. The inner tube carries the gimbals. The external frame of the barometer is a cylindrical tube of wood, on which slides a brass socket; and in this is inserted the innermost pair of pivots of the gimbals or universal joint, which furnishes the instrument with a moveable point of suspension. The top is terminated with a knob of brass, of a weight nearly equal to that of the mercury, &c. at the lower end. With respect to the position of the point of suspension, no general rule can be given, applicable to every case; though it is a circumstance on which the oscillations of the mercury greatly depend. It is obvious, however, that though this point were accurately determined for one particular height of the mercury, it would not correspond to every other. By the ingenious contrivance of Mr Troughton of placing a knob at the top, as a counterpoise to the weight of the mercury, the centre of gravity of the whole will be about the middle; and if the instrument were of the same specific gravity throughout, the point of suspension that would produce the smallest oscillations in the mercury would be about $\frac{1}{3}$ of the length of the instrument from the top, considering the lower part as a fixed point. But as this is not strictly the case, the point of suspension is best ascertained by experiment. The graduation is on two scales of ivory, about four inches long, for the reception of which, two opposite quarters of the cylindrical frame are *crossed out* through that length, their planes pointing towards the centre of the tube. The index is a very light one, and slides upon the glass tube without touching any other part. At the bottom is the usual screw, which pressing up the leather bag, prevents the mercury from moving when the instrument is carried from one place to another. Fig. 9, and 10. represent sections of this barometer on a larger scale.

Fig. 8.

Fig. 9, 10.

Attempts to enlarge the barometrical scale.

After it was observed that the different heights of the mercury served, in some degree, to indicate the state of the weather, many attempts were made to enlarge the extent of the barometrical scale, in order to measure the smallest variations in the weight of the atmosphere. These attempts soon gave rise to a considerable variety of barometers, differing in form from the common barometer, and whose scales though less accurate, were so much increased in extent, as to point out the most minute changes in the pressure of the air.

Descartes' barometer.

Descartes was the first who thought of enlarging the barometrical scale, and for this purpose he invented a barometer which still retains his name. It consisted of a tube of about four feet and a half long, swelled out towards the middle, as represented by CD, Fig. 5.; AC was filled with water, the point C being about 31 inches above the surface of the mercury in the cistern B. The diameter of the tube AC may be to that of the part CD in any ratio. By this construction, the range of the scale would be nearly as great as if the whole fluid were water, or about 40 inches, if we neglect the weight of the water, which is inconsiderable compared with that of the mercury. Huygens constructed a barometer of this kind; but, owing to the escape of the air from the water, or to the vapour produced in the vacuum at the top of the tube, the variations were not nearly so sensible as he expected.

Plate LIII. Fig. 5.

Huygens' barometer.

Plate LIII. Fig. 6.

He therefore thought of altering the relative position of the mercury and water, in the following manner: ABC, Fig. 6. is a bent tube hermetically sealed at C, and open at A. At DE and FG the tube is swelled out into two equal cylindrical vessels, which are about 29 inches asunder. The diameter of the bore of the tube is about 1 line; that of the cylinders 15 lines, and their depth 10. The limb BC is then filled with mercury, and the barometer being placed in a proper position, as much mercury is retained as occupies EBF. Oil of tartar, (a solution of tartrate of potass,) or any other liquor which does not freeze readily, or act upon the mercury, is poured into AE till it rises to a suitable height above the surface of the mercury at E.

Since the two cylinders are equal, and since their diameters are to the diameter of the tube in any ratio whatsoever, it is evident, that, by this construction, the smallest difference in the atmospherical pressure may be estimated. The scale, however, owing to the nature of hydrostatical pressure, is not capable of being extended beyond certain limits. The liquor will only rise above D, till its weight, together with that of the air, becomes a counterpoise to the mercury in the other limb. Its evaporation is, in some measure, prevented by a thin film of oil on its surface.

This barometer has several defects. The column of mercury is supported above its level at the lower surface, not only by the weight of the air, but also by that of the liquor above it, which increases with the height: when the weight of the air diminishes, the pressure of the liquor increases, and conversely; for the motion of the mercury causing the liquor to increase or diminish in altitude, the apparent effect of the air will be increased or diminished in like manner; the pressure of fluids being in the compound ratio of their bases and altitudes. The friction, varying with the height of the liquor, must be another source of inaccuracy. The liquor itself must also be considerably affected in bulk by heat and cold; and to these inconveniences it may be added, that, notwithstanding the film of oil on its surface, it will gradually evaporate, and render the scale erroneous.

Ho bar Pl. LII Fig

The barometer of Hooke may be considered as an improvement on that of Huygens. This barometer, represented Fig. 7, is composed of two tubes ABC. The parts AD and EF are equally wide, and the bore of CE is made as much narrower as it is proposed to enlarge the scale. IBG is filled with mercury, the part AI forming a vacuum. HG is occupied by some fluid lighter than mercury, as a solution of tartrate of potass, and CH by some fluid still lighter, as petroleum, which has little tendency to mix with the other. The cistern C is of the same diameter with AD.

From this construction we may readily perceive the following advantages: The height of the two liquors above the mercury is always the same, whatever be the weight of the air; and the straight tube CE being always filled by the liquors, the friction to which it gives rise must be constantly the same.

The range of the scale, which will be determined by the motions of the line of separation H of the two liquors, will have the same extent as that of the barometer of Descartes and Huygens. Though this barometer is among the best of those with an enlarged scale, it is not free from imperfections: the weight or pressure of the fluids on the surface of the mercury will differ on account of their difference of specific gravity; and they will gradually mix together, so that the line of separation will at last become incapable of being distinguished.

M. de la Hire, in the memoirs of the Academy o. Sciences for 1708, speaks of the above method employed by Hooke for correcting the defects of the double barometer; and he says that he mentioned it to Huygens in 1690. M. Amontons also affirms, in a work which he printed in 1695, that the same method had occurred to him eight or ten years before; and that he disclosed it to M. Hubin, who had executed a barometer of the same kind, without having previously communicated with any person on the subject. When Hubin went afterwards to England, Hooke proposed the same thing to him; and indeed the honour of the invention is due to this philosopher, if we adjudge it by priority of claim, for it appears that he had suggested the double barometer which bears his name, in 1668. *Phil. Trans.* No. 18[illegible].

We are indebted also to Hooke for the wheel-barometer, which he invented the same year. This form of the barometer, (See Fig. 11.) on account of its exhibiting the rise and fall of the mercury in a very conspicuous manner, is become extremely common. The tube is generally concealed in the frame; but, for the sake of representing the whole in one figure, we have made it to appear in front; it is about 40 inches long, but 6 inches of the lower end is bent upwards, so as to become parallel to the rest of the tube.

As an inch of rise of the mercury in the longer leg will cause an inch of descent in the shorter, the bores being equal, the two surfaces will thus be 2 inches apart; and this alteration cannot be effected by a less pressure of the air than that which causes 2 inches of rise in the Torricellian tube. Hence the range of the scale is only half that of the common barometer. But this defect is compensated by converting the perpendicular motion of the mercury into a rotatory one,

biting it on a circular dial plate. For this
a piece of ivory of a bell form is made to
the surface of the mercury in the shorter
ing a silk thread fastened to its upper end,
assing over a pulley, is stretched by a weight
early a counterpoise. By this means the mo-
the mercury is communicated to an index,
urns round a graduated circle, and thus the
range is enlarged at pleasure. The motion
dex in the wheel barometer has been render-
sensible by Mr Russel of Falkirk, by the
of a little wheelwork.

r the same figure we may refer to the syphon
er; for the form of the tube, and the motion
ercury, are the same in both. This, at least
r, is one of the most elegant modifications of
ricellian tube. It consists of the tube appli-
frame of wood, with the addition of a sliding
rass nearly of the same length. At the lower
he bar is an index, which, in observing the
, is to be set opposite its surface in the short-
the upper end of the bar is divided into a
inches, whose zero is the index below. The
urnished with a sliding hand for pointing to
ice of the mercury in the longer tube, and
a vernier for distinguishing the smaller divi-
By this simple contrivance, the sum of the
of the mercury in both legs is correctly ex-
and measured at top.

inclined or *diagonal barometer* (Fig. 8.)
er form of this instrument, for augmenting
. It differs from the common barometer in
he upper part of the tube, where the scale is
bent at B, so that the range is on AB instead
By this arrangement, when the mercury
t *d* in the Torricellian tube, it will stand at D
istrument, D*d* being parallel to the horizon.
he scale, compared with that of the common
er, will be enlarged in the ratio of AB to *a* B;
which admits of unlimited increase, since AB
nade indefinitely great with respect to *a* B.

l the methods which have been proposed for
g the range of the barometrical scale, this
be the most susceptible of accuracy. The
ections to which it is liable, are, the friction
rom the increased column of mercury against
of the tube, and the possibility of the mer-
arating into detached portions during its de-
the inclined part. The invention of the in-
rometer is generally ascribed to Sir Samuel
d; but this is doubtful. Derham, who has
d it in the *Phil. Trans.* for 1698, No. 236,
tions that it had been communicated to him
end. The invention itself is so obvious in
, that it scarcely merits enquiry to whom it

rectangular barometer (Fig. 9.) 'consists
ABC bent at right angles, and swelled out
which includes the vertical range of the mer-
a cylindrical cistern. The scale is reckon-
e horizontal part of the tube CB, and may
ged to an unlimited extent, by making the
the tube indefinitely small, in comparison of
rn AD. The mercury is prevented from
out at C, by the pressure of the air acting

upon its surface at E. When the weight of the air is increased, so as to produce an ascent of one inch of the mercury in the Torricellian tube, it will also produce an ascent of one inch in AD; but in order to do this, the mercury must be supplied from CB, and the space through which it moves from E towards B, will be to one inch, as the square of the diameter of AD to the square of the diameter of the bore of CB.

Barometer with a lever.
Plate LIII.
Fig. 10.

Another contrivance for enlarging the scale of the barometer, is represented by Fig. 10. ABD is a bent tube of the common diameter, terminated at the upper extremity by the bulb A, in order that the ascents and descents of the mercury may be chiefly in the leg BD. EG is an index moveable about F as a centre; DC is a float of ivory or glass, attached by a slender wire to the extremity E of EG, and which, by its ascent and descent on the surface of the mercury, communicates motion to the index. By this means the scale is enlarged in the ratio of FG to EF; but the friction is considerable, so that little reliance can be placed on the degrees pointed out by the index. It may be useful, however, merely to point out changes in the atmospherical pressure, where the real amount of these is of little importance.

We shall conclude the account of the methods that have been proposed for enlarging the extent of the barometrical scale, by a description of a barometer invented for that purpose by Mr Rowning.

Rowning's barometer.
Plate LIII.
Fig. 11.

In Fig. 11. ABCD is a cylindrical vessel filled with a fluid to the height W, in which is immersed the barometer SP, consisting of the following parts: The principal one is the glass tube TP, (represented separately by *t p*,) whose upper end T is hermetically sealed; this end does not appear to the eye, being received into the lower end of a tin pipe GH, which in its other end G receives a cylindric rod or tube ST, and thus fixes it to the tube TP. This rod ST may be taken off, in order to substitute for it a longer or a lesser, as occasion may require. S is a star at the top of the rod ST, and serves as an index by pointing to the graduated scale LA, which is fixed to the cover of the vessel ABCD. MN is a large cylindrical tube made of tin, (represented separately by *m n*,) which receives into its cavity the smaller part of the tube TP, and is well cemented to it at both ends, that none of the fluid may get in. The tube TP, with this apparatus being filled with mercury, and plunged into the bason MP, which hangs by two or more wires upon the lower end of the tube MN, must be so poised as to float in the liquor contained in the vessel ABCD; and then the whole machine rises when the atmosphere becomes lighter, and *vice versa*. Let it now be supposed that the fluid made use of is water; that the given variation in the weight of the atmosphere is such, that, by pressing on the surface of the water at W, the surface of the mercury at X may be raised an inch higher (reckoning from its surface at P) than before; and that the breadth of the cavity of the tube at X and of the bason at P, are such, that, by this ascent of the mercury, there may be a cubic inch of it in the cavity X more than before, and consequently in the bason a cubic inch less. Now, upon this supposition, there will be a cubic inch of water in the bason more than there was before, because the water will occupy the space which the mercury has left. The whole machine will therefore be rendered heavier by the weight of a cubic inch of water; and, by the laws of hydrostatics, will sink till a cubic inch of that part of the rod WS, which was above the surface of the water at W, comes under it. Here if we suppose this rod so small that a cubic inch of it shall be 14 inches in length, the whole machine will sink 14 inches lower in the fluid than before; and consequently the surface of the mercury in the bason will be pressed, more than it was before, by a column of water 14 inches high. But the pressure of 14 inches of water is equal to one of mercury; and this additional pressure will make the mercury ascend at X, as much as the supposed variation in the weight of the air did at first. This ascent will make room for a second cubic inch of water to enter the bason; the machine will therefore be again rendered so much heavier, and will subside 14 inches farther, and so on *in infinitum*. If less than 14 inches of the rod be sufficient to make a cubic inch, the scale of variation will be finite, and may be made in any proportion to the common one.

Mr Rowning never actually constructed a barometer according to the above principles, nor, so far as we know, has it been executed by any other person. It might, no doubt, point out very minute changes on the weight of the atmosphere; but the difficulty of adapting a scale to it, would render it of little practical utility.

Self-registering barometers.

It is extremely desirable, for meteorological purposes, to have a regular and successive series of the changes which take place in the pressure of the atmosphere during any given period; but as this would require constant attendance on the part of the observer, mechanical contrivances have been adopted for registering the indications of the barometer, and retaining them in a connected form: When the instrument is fitted up in this manner, it is called a *self-registering barometer*.

The most simple kinds of self-registering barometers are such as indicate the greatest rise and fall of the mercury, or its extreme range, during any stated period; and when this only is required, the object is easily accomplished. Of this description is the self-registering barometer, invented by Alexander Keith, Esq. F. R. S. Edinburgh. It consists of a bent tube, such as ABD, Fig. 12, hermetically sealed at A. The mercury in the shorter leg supports a float, to which is affixed a slender wire terminating in a bend or knee. This knee embraces a very small wire stretched along the scale, and pushes upwards or downwards two bits of glazed silk which slide along the wire very easily, yet so as to retain the position to which they are moved by the ascent and descent of the mercury. The instrument is prepared for experiment by bringing the two bits of silk in contact with the bent knee of the float-wire; the points to which they may afterwards be removed, indicate the extreme range of the mercury during the interval of any two observations.

Plate LIII. Fig. 12.

When not only the greatest and least altitude of the mercury is sought for any given time, but also its precise height at every intermediate moment, more complicated contrivances must be employed: the instrument must then consist of a baromete
with a time-piece, and a crayon or pencil
float obeying the motions of the mer
greater number of self-registering barom
nature are so constructed, that the crayo
describe a continuous line on a vertical cy
ing on its axis by means of clock-work, a
certain number of revolutions in some
The cylinders are divided longitudinally
lines into equal spaces, corresponding to
cular portion of time; and thus the line
the crayon in that time, indicates th
heights of the mercury during its continu

M. d'Ons-en-Bray was the first who
pendulum to meteorological instrument
every contrivance which has been adopte
friction arising from the traces of the
vents, in a considerable degree, the fre
the mercury, so that the indications of
are little to be relied on. The descrip
ther instrument of a more improved cons
vented by M. Changeux, will be seen in t
de la Republique des Lettres et des A
Blancherie 1779, p. 134, 167, 170, 187
p. 30.

The principle proposed by Dr Brew
article Atmospherical *Clock*, for me
mean temperature of the atmosphere, du
ven interval, may also be employed in t
tion of a barometrical clock; by which
height of the barometer, during any give
be indicated on the dial plate. The san
tion is applicable to the hygrometer.

We shall conclude this article with
tion of several instruments which have
gested for measuring the pressure of the
which though founded on just principles
curious than useful.

The *conical* or *pendant barometer*, inv
Amontons in 1695, consists of a trunc
tube, hermetically sealed at one end, an
in a vertical position. It has no cistern;
figure of the tube, and the smallness of th
dering that unnecessary. The length m
at pleasure, and will depend on the con
the bore; so that the slower the degree
tion, the more extended will be the s
suppose 28 inches of mercury in the lo
the tube occupied 31 inches, 80 inche
range would be 80—28, or 52 inches.

This instrument may be employed as a
rometer; but the friction of the mercury
owing to the bore of the tube being nec
small, that it is seldom used.

The *statical barometer* of Otto de Gueri
and others, consisted of a large hollow
at one end of the arm of a delicate balan
poised by a weight of brass at the oppos
two bodies being of the same weight, but
volumes, if the fluid or medium in whi
suspended becomes more or less dense,
change of weight will take place, and
brium will be subverted. If the air beco
the hollow ball will appear to become l
will lose more of its weight than the c

which is more dense; on the other hand, if the air becomes lighter, a contrary effect will happen. This barometer, is obviously founded on the hydrostatical principle, that a body suspended in a fluid loses as much of its weight, as is equal to the weight of the fluid displaced. *Phil. Trans.* 1666. No. 14.

Fahrenheit proposed a barometer, founded, in principle, on the well-known fact, that the boiling point of liquids varies with the pressure on their surface. If a thermometer be taken with a large bulb, and a small bore, and the boiling points of water be marked upon it, corresponding to the various heights of the mercury in the Torricellian tube at the time of observation, the divisions on the thermometer will indicate the pressure of the air, when the instrument is afterwards plunged into boiling water. The range of the scale, however, would be very limited; as a change of atmospherical pressure, causing a descent of one inch of the mercury in the barometer, depresses the boiling point of water only 1½ degrees; the instrument would also be troublesome in application.

In the Philosophical Transactions, a barometer of the following construction is described by Mr Caswell: ABCD is a vessel filled with water, in which is immersed the barometer *msoyzerx*, consisting of a body *msoerx*, and two tubes *cx* and *oyze*. The body and the lower tube are hollow cylinders, and communicate with each other. The lower extremity of the tube *yz* has a weight affixed to it, to make the instrument sink, so that the top of the body may just swim even with the surface of the water, by the addition of necessary weights on the top. When the instrument is forced with its mouth downwards, the water ascends up into the tube to the height *ut;* and the small concave cylinder *cx* at the top gives buoyancy to the whole, and prevents the instrument from sinking below the proper depth; *md* is a wire; and mS and *cd* are two threads stretched obliquely to the surface of the water, in order to increase the range of the scale. An alteration of the gravity of the air causes the instrument to subside more or less; and a small bubble is formed where the surface of the water cuts the threads, which ascends and descends along them, as the mercury ascends and descends in the common barometer. This instrument is much commended by its inventor for its extreme delicacy; but the difficulty of applying an accurate scale to it, renders it of little value.

On the whole, it may be remarked, that the principle of the Torricellian experiment affords the best method of constructing the barometer with accuracy; particularly as, by means of a vernier scale, the height of the mercury may be readily determined to the thousandth part of an inch; a degree of correctness sufficient for every scientific and practical purpose, and which cannot be obtained with certainty by constructions of a more complicated nature.

The references to works on the subject of barometers will be given with more propriety under the articles HEIGHTS and METEOROLOGY. (A)

BARON, a distinguished person, originally holding a barony; and now either holding a barony, or capable, by letters patent, of sitting and voting in the upper house of parliament.

Baron.

Etymologists are not agreed with repect to the derivation and primary meaning of this term. The most probable account of it is, that the word baron is of German or perhaps of Celtic extraction, and that, in the language of those who first employed it, it was synonymous with *man* in general. It has this meaning in the Salic law, and in the laws of the Lombards; Philomenes renders it by ανηρ, and in the English law, the phrase "baron and feme" is equivalent to that of man and wife. Retaining its general sense, it appears next to have been used, either *in bonam* or *in malam partem;* in the former, as when it was employed to denote a man of respectability, (ανηρ, *vir*,) a stout or valiant man, and in the latter, as when *barone* is used by the Italians, to signify a beggar. From denoting a stout or valiant man, it was employed κατ' ἐξοχην as a name for a distinguished military leader; and particularly for one of those captains, who, having fought and conquered under some great commander, were afterwards rewarded by him with a part of the lands which he had acquired. This part became the property of the new possessor, and descended to his heirs, on condition of military service; understanding by these words assistance in the formation and direction, as well as in the execution of military schemes. Such was the import of the term baron, when the feudal system was established, and while its earliest institutions continued in their vigour; but changes having taken place in the state of society, and the feudal institutes having been modified or abolished, it gradually acquired the meaning which we have attempted to express in the definition at the beginning of this article. As explanatory of that definition, it may here be added, that, in reference to those who are capable of sitting and voting in the upper house of parliament, the word baron is used with a certain variety of signification. Thus, in a general sense, all noblemen are barons; as when we say, that the Duke of Norfolk is, with the exception of the blood royal, the first baron of England, or that the Duke of Hamilton is, with the same exception, the first baron of Scotland; but, in a sense more limited and appropriate, he only is a baron who has rank and place immediately after a viscount.

In the history of most European countries, the barons are represented, either as feudal lords, in possession of a certain authority over their vassals, and of certain benefits resulting from that authority; or, as the chief officers and functionaries of the crown, summoned by the monarch, as occasion required, to assist him with their advice, and attend him in his expeditions; and contributing to the dignity, as well as the efficacy, of his government, in a way similar to that in which their own vassals were bound to support them in their own individual capacity. They are to be viewed either as masters or as servants; as masters, with respect to those who acknowledged their feudal jurisdiction; and as servants, with respect to the king, whose ministers and dependants they were. See FEUDAL SYSTEM.

When we consider them as feudal superiors, we perceive them exercising many of the rights, and enjoying many of the privileges, which are now exclusively attached to royalty. Thus we find them declaring war and making peace; issuing from their castles at the head of their retainers, harassing each other with perpetual inroads and devastation, and often transmitting their resentments under the name of *faidæ* or deadly feuds to succeeding generations.* The history of Europe, during a period extending from the seventh to the eleventh century, is little more than a record of wars and excursions, undertaken without a regular plan, and followed by no other consequences than the declension of one great family and the rise of another. In particular circumstances, too, we find the barons laying aside their animosities, and mutually engaging to abstain from all acts of hostility. And in these agreements, they neither consulted the will of the monarch, nor were, in any way, solicitous about his approbation or displeasure. A remarkable instance of a truce between the Earl of Gloucester and the Earl Marshall, and into which Morgan, the son of Hoel, a Welsh prince, was allowed to enter or not as he should think fit, is given by Dr Stuart, in the Appendix to his View of Society in Europe, No. 4, to which, as corroborative of the preceding statements, we beg leave to refer our readers.

A second privilege of the feudal lords was, that of trying causes and distributing justice among their vassals. This privilege seems to have belonged to many of them in its fullest extent. There is a distinction recognised by those who have given us any account of the feudal times, between what was denominated the high and the low justice; *justice haut et bas, alte et basse;* and to this distinction it is necessary that we attend, in order to form an accurate idea of the judicial and executive powers which were vested in the feudal lords. The high justice comprehended offences of every description, whether criminal or civil; and especially those which were punishable "*ferro, fossa, et furca,*" (Du Cange, *voc. fossa:* Tacit. *De Mor. German.* c. 12.), while the low justice was confined entirely to civil offences, and even in regard to these, was limited to petty transgressions. While all the barons claimed the right of administering the low justice, some of more extensive territory and of greater power, both claimed and exercised the right of administering the high. They determined causes in which the life or death of the offending party was concerned. As they commanded their vassals in the field, so they settled disputes and ordained punishments in the great hall of their castles. It was here that the baron's court was held: And as the king was often unable to interfere with his nobles in the exercise of their authority, and had even in some instances, as in those of regalities and counties palatine, engaged himself never to do so, the decision of that court was final. Appeals were altogether unknown at the time when the power of the feudal aristocracy was at its height. But it would have been in vain to determine a cause against any individual without the means of carrying the sentence into effect. It was therefore necessary, or at least expedient, that the baron should call to his assistance a number of his other vassals, both in ascertaining the extent and nature of the evil, and in awarding the punishment. This was the more requis when fiefs had become perpetual, and the territor superior found himself obliged to a more circu spect and equitable distribution of justice among l retainers. Hence arose the *pares curiæ*, the assess or jurymen, whom all modern history acknowledg to have been present in the baronial courts, not compurgators or witnesses, but as actual judges right and wrong. Hence too the existence of jur at present; and hence that glorious maxim of Brit law, and proudest privilege of freedom, " that man can be condemned unless after a trial by peers." Before we conclude this part of the art we may observe, that in feudal times, the righ pardon uniformly accompanied those of judging a punishment.

A third privilege of the great barons, now a tached exclusively to royalty, was that of coining money. There can be no question that they enjoye this privilege, though it has been less attended to b writers on the feudal system, than those which we hav mentioned. Du Cange, in his article *Moneta*, introduces several documents which establish its existence and to these he adds an enumeration and descriptio of the baronial coins. The privilege alluded to was no doubt, in some degree, the result of necessity. A mark, or stamp, was wanting to indicate the purit and value of the metals in use: the king was ofte at a distance, little heard of, and not much regarded but the territorial superior was always at hand, an his authority within the limits of his jurisdiction was in many respects, exclusive and final. His mark, o stamp, therefore, became the index to his vassals, tha the money which circulated among them was of th proper fineness and weight. The right of coinage, thus assumed and exercised, was afterwards recognised by many of the sovereigns and parliaments of Europe. It belonged to the ecclesiastical as well a to the lay barons. In an agreement between Philip the Fair and one of his bishops, (A. D. 1307,) the words of which are quoted by Du Cange in the article already referred to, it is established that the money of the bishop shall have a free circulation through the whole of his diocese, and that beyond the pale of his ecclesiastical authority it shall hav the same currency, " *Quam Moneta aliorum barone nostri regni habebant extra terras suas.*" " *Qu monetas ergo,*" infers the writer " *iisdem privileg quibus laici barones, gaudebant espiscopi.*"

Besides these privileges, now universally consider as a part of the king's prerogative, the barons enjoyed in most of the European countries, certain benefits resulting from their territorial superiorit These were what are denominated the feudal casua ties or incidents, of which we shall here give a shor though, we trust, a distinct account. They ma all, without much difficulty, be traced to the natu of the feudal tenure, or the condition of military se vice on which the vassals received and held the po tions of land which the baron assigned them. Whe the vassal was incapable by nonage, or otherwise, o

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* *Le Duc Sandragesile, ayant été tué par quelq'un de ses ennemis les Grands du Royaume, citerent ses enfans qui negligeoient d venger sa mort, et les priverent de sa succession.* Saint Foix. *Essais Hist.* tom. ii. p. 88. In this instance, the children wer punished for neglecting to exercise the right of private vengeance.

ing the condition alluded to, the fief reverted to
riginal possessor, and remained with him till the
d of minority expired, or the cause of inability
emoved. During the period of nonage, the mi-
vas educated at the expense of the baron, and
ly attended him both in the field and in the
hall of his castle. Hence arose the incident of
ship, designed in its first institution for the reci-
l benefit of the vassal and his liege lord; but in
nd, proving to be one of the most distressful of
e feudal grievances. Nearly connected with
ncident, and indeed arising from it, is that of *re-*
This was a certain sum of money, or a certain
ity of arms and habiliments of war, paid to the
by the vassal when the term of wardship ex-
, and he entered on the possession of his fief.
ay be regarded as an acknowledgment on the
of the ward, for the protection of his property,
e charge of his education. The feudal subject
commonly not backward to attend his lord in
ield; his attendance, however, was sometimes
nsed with; and in lieu of actual service, the ba-
vas content to accept of what was called a *scu-*

This constitutes the third of the casualties in-
t to the feudal tenure. But the property ori-
ly derived from the territorial superior, was not
disposed of to another, or put into the hands
s enemies, without his consent. It might be
ferred either by sale, in which case, the vassal
ased the consent of the baron by paying *a fine*
enation, or by the marriage of female heirs, in
case the feudatory was subjected to the inci-
of marriage. With regard to this last incident,
ver, it must be observed, that though what we
now stated may justly be considered as its ori-
character or condition, yet the territorial supe-
gradually acquired the *maritagium*, or right of
g his female wards in marriage to any person
ever, and in all circumstances; or of exacting a
sum if they refused to accept of his choice. In
xercise of this right, male heirs were at length
ded. When the bond between the vassal and
ord was dissolved, either by natural or civil
s, the property reverted to the original posses-
y *escheat*. The last of the feudal casualties was
id. This was at first a benevolence or gratui-
contribution on the part of the vassal, when the
ry of the baron was exhausted, when he was
us to increase the splendour of his court or of
tertainments, to form alliances, or to recover
reedom when taken prisoner by his enemies.
, however, came soon to be demanded; and the
l subject held himself bound to grant them at
on three remarkable occasions. 1. When the
t son of the baron was to be knighted. 2. When
ldest daughter was about to be given in mar-
: And, 3. When his ransom was to be paid.
sionally, however, the tyranny of the baron ex-
aids on other occasions; as to pay the debts
h he had contracted, or reliefs, or scutages to
perior lord.

aving considered the barons as masters, let us next
them in the character of servants. They formed
reat council of the monarch. They were summon-
him whenever the affairs of the kingdom demanded particular attention, or whenever he wished to accomplish any object by means of their assistance. As vassals of the crown, they were bound to obey the royal mandate. On the same account, they were liable to all the feudal incidents: and to these severe regulations, they submitted for many centuries, though often with great reluctance, and not without some attempts to limit the power by which they were enforced. But the connection between the king and his barons was by no means so intimate as that which subsisted between the feudal lords and their immediate dependants. For a great part of the year, and occasionally for many successive years, they lived at a distance from the seat of royal authority, while the number and attachment of their followers, as well as their military character, enabled them, either to disobey with impunity, or, if the sceptre happened to fall into weak hands, boldly to assert their independence. This immoderate power of the nobles, was not acquired at once. It was the result of favourable circumstances in different reigns, and of various consecutive attempts to resist the encroachments of the prerogative. Fiefs being rendered hereditary, the property in land came, by additional grants, marriages, and otherwise, into the possession of a few great families. The consequence of this was, that the chiefs of these families lived with a splendour, and appeared with a number of retainers, scarcely inferior to those of the king. In the reign of William of Normandy, the powerful Earl of Warenne held lands in twelve different counties of England; and in Scotland, the retinue of the sixth Earl of Douglas usually consisted of two thousand horse. The next step towards the independence of the barons was that of obtaining for themselves and their families, the chief offices of trust and authority under the crown. Besides the great council, which met occasionally, and in which every territorial superior possessing land to a certain amount had the right of being present, the higher nobility formed what was called the "Aula Regis," or *cour du roy*, a regular assembly to which the direction of affairs, both civil and military, was exclusively committed, and before which all questions of importance were tried and decided. According to Madox, (*Hist. of the Exchequer*,) the Aula Regis was composed of seven officers. 1. The chief justiciar, or lord justice general. 2. The constable, or principal groom. 3. The mareschall, or principal smith or farrier. 4. The seneschall, or lord high steward of the kingdom, originally also dapifer, or steward of the household. 5. The chamberlain. 6. The chancellor. 7. The treasurer; originally the deputy of the high steward, and in later times that of the chamberlain. There is no doubt that these officers were at first appointed by the king, and were removeable at pleasure. In a short time, however, the places which they held, and the honours connected with them, were attached, not to the individual, but to the fief. They descended, in conjunction with the property in land, to the heirs of the existing possessors, and like that property, which was at length fixed by entail, were considered as unalienable. The effect of the whole was, that "a person whose undutiful behaviour rendered him odious to his prince, or whose incapacity exposed

him to the contempt of the people, often held a place of power and trust equally important to both." Robertson's *Hist. of Scotland*, vol. i. p. 26.

In no kingdom of Europe did the power of the feudal aristocracy rise to a greater height than in Scotland. Besides the usual circumstances of residence among their vassals, settling their disputes, conducting them to the field, and protecting them from injury, the Scottish nobles availed themselves of a tendency which they perceived among their followers to unite more closely under the dominion of their "liege lords." The vassal, proud of the service, and glorying in the magnificence of his chief, considered himself, and wished to be considered by others, as of the same family with him, while the baron, encouraging the fiction, and at length, perhaps, persuaded of its truth, willingly acknowledged his kindredship with those who obeyed him, and saw, with pleasure, that the attachment of his dependants was strengthened by an additional tie. The whole nation was divided into clans. In each of these every individual bore the name of his feudal superior, regarded himself as a branch of his family, and was, eager to support his pretensions. When engaged in disputes with the king, therefore, the nobles, followed by a multitude of bold and martial retainers, devoted to their interest, were not often inclined to yield. Retiring to their castles, frequently strong by nature, and situated in regions almost inaccessible, they violated, with impunity, the laws enacted by the Scottish parliament, afforded protection to criminals, refused to deliver them up, and set the authority of the crown at defiance. Even so late as the time of Mary, nearly one fourth part of the kingdom was summoned to attend her chief justice in arms, before a few robbers on the border could be tried for their crimes. (Keith, *Hist. of Scotland*, p. 198.) Nor was this all. In order still farther to establish their independence, the Scottish nobles entered into leagues of mutual defence and support. It is not to be denied, however, that these were originally formed, rather with a view to repel the inroads of hostile clans, than to limit the authority of the monarch. But it is equally certain, that whenever a dispute arose between any of the united families and the king, the whole association would oppose the royal pretensions, and, according to their numbers and abilities, would do so with success. In the reign of James II. the most powerful of the Scottish barons was William Earl of Douglas. But though at the head of vassals more numerous and warlike than any chieftain of his country had ever led to the field, this was not the only source of his power. He was united in firm alliance with the Earls of Crawford, Ross, and Murray, and with the whole name of the Hamiltons. These rendered him not so much the subject of the king as his equal. And had not James, by a deed of violence, deprived him of life, and thus dissolved the association, it might have shaken the foundations of the throne, and transferred the crown from the house of Stuart to the family of Douglas.

The history of the feudal establishment in general, is replete with struggles between the nobles and the monarch. In reigns when great vigour and activity were displayed by the king, there is reason to believe
that he was often the aggressor; and tha
usual exactions, he roused the barons,
degree forced them to limit his encroach
resist his claims. One of the most po
binations of the English nobility, with
lighten the burden of subjection, by ascer
privileges, was formed in the reign of
Conqueror; a ruler distinguished by th
his government. It was the tyranny of t
and of his immediate successor, that urge
to demand a charter of their liberties fro
who, in the beginning of his reign, was p
cumstances that rendered it necessary for
the affections of his people. Other cl
similar nature were granted by kings, wl
are usually considered as the most splenc
ment recorded in English history. On t
it is not to be disputed, that when the sc
irresolute and capricious, the barons may
advantage of his weakness, and broug
claims, which, had they been placed in
cumstances, they would have judged it
press. Of this assertion, the reign of Jo
conspicuous and memorable proof. Des
gour, skill, or perseverance, this wretche
first deserted by his nobles, and then co
retire before them. In proportion to hi
and the calamitous state of his affairs, tl
a higher tone, multiplied their demands,
to make concessions; till, on the plain of
they extorted from him the great char
liberties, which every Englishman now re
most valuable portion of his birth-right.
has been celebrated by Professor Richarc
worthy of its magnitude and importance

> ——Hail, Runny-mead!
> Illustrious field! like Marathon renowned
> Or Salamis, where freedom on the hosts
> Of Persia, from her radiant sword, shook
> And dire discomfiture! Even now I tread
> Where Albion's ancient BARONS won the
> Of independence:————
> O gallant chiefs! whether ye ride the win
> Bound on some high commission to confou
> The pride of guilty kings; or, to alarm
> Their coward spirits, through the realms
> Hurl the tremendous comet, or in bowers
> Of blooming paradise enjoy repose;
> I ween the memory of your patriot zeal
> Exalts your glory, and sublimes your joys.
> RICHARDSON's *Poems*. *Ru*

The division of the barons into the
minores, the greater and lesser barons,
passed over without particular notice;
division the House of Commons unquesti
its rise. According to the feudal cons
immediate vassal of the crown, or those
the sovereign *in capite*, were indiscrimin
ted into the national council. These w
most part, men of great estates and
fluence. To such opulent individuals, a
parliament could not be burdensome.
gress of society, however, and by the
circumstances, which cannot be specifi
property of the barons was gradually d
or separated into smaller portions; the
possessors holding the same rank was

increased; alienation of land became frequent; and many families, once opulent and powerful, were at length reduced to poverty and dependence. In consequence of these changes, the small barons were often inclined to withdraw themselves from an expensive attendance in parliament, and to relinquish their privilege of sitting and voting in the national council. Accordingly, their attendance was, at first, occasionally dispensed with: they were no longer individually called to give their advice and assistance. In the great charter it is distinctly intimated, that the archbishops, bishops, earls, and greater barons, (*majores barones*,) shall be personally summoned to attend the meeting of parliament "at a certain place, with forty days notice;" and that the rest of the ing's tenants *in capite*, shall receive a general citaon from the sheriffs of their respective counties. he next step probably was, that the small barons particular districts, should succeed and relieve one other by turns, as often as the sovereign required eir presence, (Blackstone, *Comment.* vol. i. p. 174. te). And last of all, it was found more convenient at some persons best qualified for the duty of parment, and most willing to accept of the commison, should be chosen by general consent, and suprted at the common expense, in order to represent eir constituents in the chief assembly of the nation. ch is probably the way in which the knights of e shire were introduced into parliament; though, om the want of records, occasioned by the civil ars, no distinct and certain account of that remarkle event can be given. There is no doubt, hower, that it took place at least in the reign of King enry III. or about the year 1266. See PARLIAENT.

The separation of the parliament into two houses s not exactly contemporaneous with the representation of counties by the knights of the shire. These ing originally of the same rank with the greater rons, continued for some time to sit and vote in at was afterwards called the House of Peers. The ne was at first the case with the representatives of roughs, though of inferior rank. But the number burgesses that were sent to parliament having, in hort time, been greatly augmented, they found it venient or necessary to meet in a separate place: d the knights of the shire, being the represenives of counties as they were of boroughs, uniwith them, and formed themselves into a dist assembly called the House of Commons. On s important union, the late Professor Millar, to om we are indebted for some of the preceding obvations, makes the following remarks. "The coion of these two orders of deputies," says this nent writer, "may perhaps be regarded as the at cause of the authority acquired by the English use of Commons. The members of that house were, this measure, exalted to higher consideration and pect, from the increase of their numbers, as well from the augmentation of their property. They w represented the mercantile people and the landed ntry, who, exclusive of those who remained in a ate of servitude, composed the great body of the people, and who possessed a great proportion of the national wealth. Of these two classes, the landed gentry for a long time enjoyed the first rank; and the deputies of boroughs were therefore frequently chosen from among the neighbouring gentlemen, (once the lesser barons,) who, by reason of their independence, were more capable than their own burgesses of protecting their constituents. By joining together and confounding these different orders of representatives, the importance of either was in some degree communicated to both: at the same time, that the people, under so many leaders, became attentive to their common privileges, and were taught to unite in defending them. Had all the constituents appeared in the national council, they would have been a disorderly multitude, without aim or direction: by choosing deputies to manage their parliamentary interest, they became an army reduced into regular subordination, and conducted by intelligent officers." *Historical View of the English Government*, vol. ii. p. 224.

The right or privilege which the barons enjoyed, of sitting and voting in the great national council, may be considered in reference to three distinct periods of English history. The first extends from the Norman conquest to the last years in the reign of King John: The second reaches from that period to the 11th of Richard II.: And the third extends from the 11th of King Richard II. to the present time. During the first of these periods, the barons held their places in the great council of the nation, or rather were obliged to attend the meetings of that council, as possessors of land belonging to the king. They were, therefore, denominated barons *by tenure*. In the second period the king assumed the privilege of calling individuals into parliament *by writ*, though these individuals were not the feudal subjects of the crown. This was unquestionably a great innovation: yet it was the opinion of Lord Coke, and is now, indeed, understood to be the law, that any person, summoned by writ to attend the meetings of parliament, who shall have once taken his seat in the upper house, becomes in all respects a baron, or procures by that circumstance a barony for himself and his heirs in full and perpetual right. In the beginning of the last period, the practice of creating peers by letters patent was introduced. For, in the 11th of Richard II., John de Beauchamp, seneschallus or steward of the king's household, was declared, by patent, Lord Beauchamp of Kidderminster, in tail male *. It is true, the example of Richard was not immediately followed: yet the practice begun by that monarch became ultimately general, and peerages are now created at the pleasure of the crown, without regard either to estate or tenure.

It remains that we conclude this article by stating, that the specific rank or place of a baron, as distinguished from the other orders of nobility, is known most certainly by his coronet and robes, and likewise by the style in which he is addressed. A baron's coronet is a rim of gold adorned with six pearls or balls: his parliamentary robe is of scarlet, lined with white satin, having two guards of white fur, and two rows of gold spots upon the shoulder. His cap is the same with that of the viscount. He is styled Right Honourable, and in public documents, the Most Noble Lord. By the king or queen he is addressed, Right Trusty and Well-beloved. He may appoint three chaplains. See Selden's *Titles of Honour*, Part II. ch. v.; and *Additions*, p. 998, or No. 190 and 196. Blackstone's *Comment.* Book I. ch. 12. Millar's *Historical View of the English Government*, vol. ii. Stuart's *View of Society in Europe*, p. 76. (*h*)

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* *I remember*," says Selden, "*one instance of a spiritual baron thus created.*" Titles of Honour, part ii. p. 774.

BARONET, a gentleman having the title of *Sir*, in virtue of his patent, and taking place of all knights; with two exceptions,—knights bannerets, created by the sovereign in person, in the field, and under the royal banner,—and the knights of St George, or of the Garter. This title is the lowest honour which is hereditary, and is usually descendible to the issue male.

The order of knights baronets was instituted by James I. of England, in the year 1611, at the suggestion of Cecil Earl of Salisbury, (*Hume*, viii. 283.) who recommended its establishment to the king as an expedient by which money might be raised. The money was to be employed in reducing and civilizing the province of Ulster, the inhabitants of which were at that time in arms against the English government. The form of creation is given by Selden, *Titles of Honour*, part ii. ch. v. § 46. In the preamble, the king states, that he was desirous "*nova merita novis dignitatum insignibus, rependere;*" and therefore, he adds, "*ex certa scientia, et mero motu nostris, ordinavimus, ereximus, constituimus, et creavimus, quendam statum, gradum, dignitatem, nomen et titulum* BARONETTI, *intra hoc regnum nostrum Angliæ, perpetuis temporibus, duraturum.*" The patent was originally granted to none but such as were of good birth, at least descended of a grandfather, by the father's side, that bare arms, and in possession of a yearly income amounting to £1000; and the number of those who could receive it was limited to two hundred. By the terms of the patent, every individual admitted to the honour, was either to raise 30 foot-soldiers, and maintain them in Ulster, at his own expense, during a period of three years, or, what was rather wished, to pay into the exchequer the sum of £1000, which was supposed to be nearly an equivalent. Accordingly, commissioners were appointed to sit at Whitehall, with a view to receive those who might apply; and one hundred gentlemen, advancing each a thousand pounds, had the title of baronet conferred upon them. Of these, Sir Nicholas Bacon of Redgrave, in Suffolk, was the first: a circumstance, on account of which, his successor is still designated *Primus Baronettorum Angliæ*. The number of baronets have since been augmented greatly beyond the limit at first intended.

All the baronets of England have, superadded to their family insignia, the arms of the ancient kings of Ulster; viz. A hand, *gules* or a bloody hand, in a field *argent*. These they may bear, either in a *canton* or in an escutcheon of pretence. Both they, and their eldest sons on coming of age, have the privilege of demanding knighthood. The word *Baronet* is placed at the end of their surnames, and their wives
are styled *Lady* or *Dame*. The rank or pl
nets, with regard particularly to the y
of barons and viscounts, was for some ti
keen dispute, but was at length settled i
document published by authority of the
I.) which those who have a taste for suc
composition, will find in Selden, *Tit. of*
§ 3d. In this document it is announced,
jesty, who best knew his own royal mean
founded the order, " hath finally sentence
and established, that the younger sons o
and barons, shall take place and preceden
baronets." Among themselves, the ba
according to the date of their patents.

The baronets of Scotland are otherwi
ronets of Nova Scotia. This institutio
wise designed by James I. and was rega
as a method at once honourable and easy
ting the province of Nova Scotia in Nor
a part of the western continent, which
been discovered and occupied by the Eng
however, was prevented by circumstance
cannot mention in this place, from execu
pose; and the order was not established
1625, in the reign of his son Charles I.
Gordon of Gordonstone, a cadet of the S
mily, was the first baronet of Nova Scotia
portion of land in Acadia, or New Scotlan
ed to each of those on whom the dignity w
and to their heirs in perpetual succession: t
were to hold of Sir William Alexander,
created Earl of Stirling, and at that t
jesty's lieutenant in Nova Scotia. But,
norance which then prevailed with res
geography of North America, it may e
ceived that the land was not portioned ou
accuracy; and that these titled advent
not only be frequently altogether unacqu
the exact bounds prescribed for them, b
charters would sometimes interfere with
In the letters patent it was declared, th
nets of Nova Scotia, and their heirs and
should have precedency of all knights ca
of all the lairds or inferior barons of Scot
every other gentleman not belonging to
orders of nobility, excepting the king'
above mentioned, and his heirs male, to
their wives and children. They were to
Sir, and to have the word *Baronet*, in
and documents adjoined to their names.
like those of the English baronets, are st
Dame. The knights of this order have
privilege, granted to them under the
A. D. 1629, of wearing round their necks
tawney coloured silk ribbon," from w
medal with an imperial crown above the
of the Scottish arms, inscribed with
Pax mentis honestæ gloria. In additi
family arms, they bear, either in a *canton*
cutcheon, the insignia of Nova Scotia;
a cross of St Andrew, *azure* charged
cutcheon of the royal arms of Scotland;
supporters on the right, the royal uni
the left, a savage or wild man, *proper*.

a branch of laurel, and a thistle issuing from two hands conjoined: the motto, *Munit hæc, et altera vincit.*

This order has experienced a considerable variety of fortunes. It was confirmed and established by a convention of estates, A. D. 1630, and by an act of the Scottish parliament, A. D. 1633. During the usurpation of Cromwell, the title and dignity were almost annihilated. They were little known during the reign of Charles II. After that period, some attempts were made to restore them, particularly in the years 1721 to 1734; but without effect. At length, however, in the reign of our present king, and in the year 1775, such measures were taken as have raised the knights baronets of Nova Scotia to their original dignity. (*h*)

BARRA, a kingdom of Africa, situated on the north bank of the Gambia, at the mouth of that river, and extending about eighteen leagues along the coast. As this kingdom is more worthy of notice than any of those upon the river Gambia, we shall present our readers with a very interesting account of it from Durand's *Voyage to Senegal.*

The kingdom of Barra is almost entirely peopled by strangers, as the natives of the country are there only few in number. The greatest population is that of the Mandingos or Mandings, so called from the name of their native country Mandin or Mandingue, which is situated about four hundred leagues to the east, and is prodigiously peopled, as is evident from the vast number of slaves which it furnishes every year, as well as from the colonies, which frequently proceed from it to extend their active industry to other quarters. It was thus that there arrived in the kingdom of Barra those who are considered as natives, and who have possessed themselves of the supreme power, and the whole of the commerce; the king and his great men being Mandingos. They are the only well informed persons in the state; for they know almost every thing, and can read and write. They have public schools, in which the Marabous, who are the masters, teach the children the Arabic tongue; their lessons are written on small pieces of white wood: but they give the preference to the paper which we have introduced amongst them. When they know the alcoran, they obtain the title of doctors.

It is remarkable, that the Mandingos, who have all come from a republican state, have formed nothing but monarchies wherever they have established themselves; but they have not invested their kings with unlimited authority. On all important occasions, these princes are obliged to convoke a meeting of the wisest old men, by whose advice they act, and without which they can neither declare war nor make peace.

In all the large towns, the people have a chief magistrate, who bears the name of alcaide, and whose place is hereditary: his duty is to preserve order, to receive the tribute imposed upon travellers, and to preside at the sittings of the tribunal of justice. The jurisdiction is composed of old men who are free; and their meeting is called a palaver: it holds its sittings in the open air, and with much solemnity. The affairs which are brought for discussion, are investigated with much candour; the witnesses are publicly heard; and the decisions generally excite the approbation of both parties.

They have no written laws, but decide on the cases according to their ancient customs; nevertheless, they sometimes have recourse to the civil institutes of Mahomet; and when the Koran does not appear to them sufficiently perspicuous, they consult a commentary entitled Al Scharra, which contains a complete exposition of the civil and criminal laws of Islamism. They have amongst them people who exercise the profession of counsellors, or interpreters of the laws, and who are allowed to plead either for the accuser or the accused, as at European tribunals: these negro-lawyers are Mahometans, and have, or pretend to have, studied, with particular attention, the institutions of the prophet. In the art of chicanery they equal the most acute pleaders of civilized countries.

These people follow the laws of Mahomet, of which they are rigid observers: most of them neither drink wine nor spirits; and all fast with the utmost rigour during the Maradan or Lent. They breed no hogs, because their laws forbid the eating of their flesh; though they might sell them to great advantage. They are very affectionate amongst themselves, and always assist each other. It is not understood that they make slaves, as this punishment is only decreed by the king, and chiefly against the great people who are guilty of crimes. In other respects they are more polished than the rest of the negroes; are of a mild character, sensible, and benevolent: all which qualities may be attributed to their love for commerce, and to the extensive travels in which they are continually engaged. The ease with which they cultivate their lands proves their industry: they are covered with palm, banyan, fig, and other useful trees. The people have but few horses, though the country is well adapted to breeding them; but they have a number of asses, which they use for travelling, and their territory abounds with wild buffaloes.

The Mandingoes are particularly industrious in making salt, which they do in a peculiar manner. They put river water in the halves of calabashes, or in shallow earthen pots, and expose it to the sun, the heat of which produces crystals of salt, the same as in ordinary pits: for the water is always much impregnated with the saline principle, as the sea mixes with it a considerable way up the river. In a short time after the calabashes have been exposed, a cream of fine white salt is formed on the surface, and this is taken off three or four times; after which the vessels are filled again. They have also very abundant salt-pits at Joal and Faquiou, and their produce forms an important branch of trade; they load their canoes with it; and ascending the river as far as Barraconda, they exchange it for maize, cotton stuffs, ivory, gold dust, &c.

The great number of canoes and men employed in this commerce gives great influence and respect to the king of Barra. Indeed, he is the most powerful and terrible of all the kings of the Gambia; he has imposed considerable duties on the ships of all nations, each of which, whatever may be its size, is obliged to pay on entering the river, a duty equal to about five hundred livres, or nearly £21 sterling. The governor of Gillifrie is charged with the receipt of these duties, and he is always attended by a number of persons who are very importunate: they are incessantly asking for whatever pleases their fancy, and pursue their demands with such ardour and perseverance, that to get rid of them the navigators are almost always obliged to satisfy their desires.

The Mandingos are above the middle size, are well made, robust, and capable of bearing great fatigue. The women are stout, active, and pretty. The clothes of both sexes are of cotton, which they manufacture themselves. The men wear drawers, which hang half way down the thigh, and an open tunic, similar to our surplice. They have sandals on their feet, and cotton caps on their heads. The women's dress consists of two pieces of linen six feet long and about three wide; the one is plaited round the loins, and falls down to the ancle, forming a kind of petticoat; while the other negligently covers their bosom and shoulders.

Their habitations, like those of all the other negroes, are small and inconvenient huts. A mud wall about four feet high, over which is a conical opening made of bamboos and straw, serves for the residence of the rich man, as well as of the humblest slave. The furniture is equally uncouth: their beds are made of a bundle of reeds placed on pickets two feet high, and covered with a mat or an ox's skin; a jar for water, a few earthen vessels for boiling their meat, with some wooden bowls, calabashes, and one or two stools, form the whole of their household goods.

All the Mandingos in a free state have several women; but they cannot marry two sisters. These women have each a hut; while all the hovels belonging to one master are surrounded by a lattice-work of bamboo made with much art: an assemblage of this kind is called *Sirk*, or *Sourk*. Several of these enclosures, separated by narrow paths, compose a town; but the huts are placed with much irregularity, and according to the caprice of the person to whom they belong. The only point to which they attend is to have the door in a south-westerly direction, that it may admit the sea breezes.

In each town a spot is set apart for the assemblies of the old men; it is enclosed by interlaced reeds, and generally covered by trees which protect it from the sun. Here they discuss public affairs, and try causes; the idle and profligate also resort hither to smoke their pipes and hear the news.

In several parts they have missourates or mosques, where they meet to say the prayers prescribed by the Koran.

The population of the free Mandingos, forms at the utmost, about one-fourth of the inhabitants of the country which they occupy. The remaining three-fourths are born in slavery, and have no hope of escaping from it: they are employed in all servile labours; but the free Mandingo has no right to take the life of his slave, nor to sell him to a foreigner, unless he has been publicly tried, and decreed to deserve such a punishment. The prisoners of war, those imprisoned for crimes or debt, and those who are taken from the centre of Africa and brought to the coast for sale, have no right to appeal, as their masters may treat and dispose of them according to their fancy.

Another part of the population of the kingdom of
Barra, is composed of the descendants of the
guese families who remain in the country, and of
we have already spoken. Such persons, or
those who take the title of Portuguese (for
Mulattos, and even men who are almost blac
themselves Portuguese, and to doubt their o
an affront they do not pardon,) profess the c
religion, and have churches and priests in di
parts. They are recognised by their costume
wear a great chaplet suspended from the neck,
long sword by their side, a shirt, a cloak, a h
a poignard.

Some of these people devote themselves t
merce and agriculture, and are generally adroit,
and enterprising. They acquire property, liv
pily, and are much esteemed; but by far the
est part live in the most complete state of id
and in consequence of being poor, addict then
to thieving; they also pass their time in th
disgusting state of libertinism, and are equally
sed by the Mahometans and the Christians.

The industrious part of these people proc
the top of the river in the canoes or boats
country, and generally perform such voyages
count of the French, who entrust them with me
dise, and pay them liberally. They have som
been attacked in their voyage, but they always
that they knew how to defend their liberty an
perty. They have also learnt from their an
never to pardon wrongs nor injuries; and if
not a precept of their religion, it is a command
fathers which necessity justifies. M. Durand is
nion that it is possible to employ, with great
tage, these men so inured to the climate, to trav
and make discoveries in the interior of Africa.

The Portuguese build their habitations acc
to the plan of their ancestors, by which they ar
solid and commodious than those of the Ne
they raise them two or three feet above the soil;
cure them from the damp, and give them a co
able length so as to divide each house into
chambers. The windows they make are very
in order to keep out the excessive heat of the c
and they never fail to build a vestibule open
sides, in which they receive visits, take their me
transact their business. The walls are seven o
feet high, and, as well as the roof, are of re
vered on both sides with a mixture of clay and
ped straw: the whole is coated with plaister.
take care to plant latane, or other trees, befor
houses, or to build them on a spot where suc
are growing, in order to enjoy the refreshing
which they produce. The king of Barra a
greatest people of his kingdom have similar
of residence. West Long. 16° 45′, North L
40′. (Q)

BARRA, or BARRAY, one of the Heb
western islands of Scotland, about 6 miles long,
broad, annexed to the county of Inverness,
island, which is low and flat on the west side, an
and irregular on the east, produces barley an
and is well stored with black cattle. Great
tities of cod and ling are caught on the east
and in one year no fewer than 30,000 were sent t
gow, and sold for about five or six pounds pe

dog fish, which are occasionally caught,
nhabitants with oil for their lamps. Shell
ɔus kinds, are found here in great abun-
:kles are particularly abundant, and in
of scarcity have been almost the chief
inhabitants. Kelp is manufactured in
nsiderable quantities. West Long. 7°
Lat. 57° 2″. (*j*)

N Isʟᴀɴᴅ, the name of one of the Asia-
situated in North Lat. 12° 15′, and a-
eagues to the East of the Andaman isles.
ix leagues in circuit; and is distinguish-
nt volcano, which throws out showers of
es, and volumes of smoke. The moun-
m the lower part of the island, which is
the level of the sea, with a slope of 32°
ıeight of 1800 feet, which is the average
other parts of the island. See *Asiatic*
vol. iv. p. 395. (*w*)

NNESS, signifies either a total incapa-
ceiving children, or of retaining the em-
ecomes formed. Many women can con-
annot retain the ovum above a few days.
ends on the state of the womb and its
These organs are sometimes malformed,
y unfit for performing their functions;
h greater number of instances they are
but have not the power of acting vigor-
e same way as a stomach which is sound
structure, may be incapable of digesting
This incapacity may be connected with,
ıt on, a general condition of the sys-
great irritability, plethora, or debility;
consequent to the operation of causes
tirely local, such as too frequent or pro-
ercourse; or circumstances affecting the
the menstrual discharge, producing ob-
painful and sparing menstruation, or too
ɔo frequent discharge, or fluor albus.
cific substances have, without foundation,
en said to produce sterility, such as beans,
seeds, sage, &c. taken internally; or
on to the womb itself of rue, vinegar, or

instances where a woman is barren with
, and fruitful with another.
of means have been employed for the re-
s reproach among women. When it de-
ganic causes, these, unless the deviation
can seldom be remedied by an operation.
ral, the structure appears to be correct;
most judicious practice is to consider
ılar state either of the constitution or of
ay have occasioned sterility, and to em-
remedies, especially for restoring the
ischarge to its proper condition. Sea-
ıics, mineral waters, and, in some cases,
usually had recourse to for this purpose,
lly, a restrained intercourse is advisable.
means are neglected, nature seems, in
es, to remove the cause, particularly when
in inordinate menstruation, or too great
f the womb. Thus women, who have
arren, have at last born children; others,
ıt mode, have been successful. Fernelius

having been consulted respecting the queen of Henry II. of France, who had been ten years barren, "*conseilla au roi de n'approcher de sa femme qu'au moment de l'eruption facile de ses regles; et ce precepte executé fut si efficace qu'il devint pere de dix enfans.*"

Sterility is, by the laws of every country, considered as a legal ground of separation. The Jews were very lax in their notions respecting divorce. The Hindoos allow of it, not merely for sterility, but also for bearing only female children. By the laws of China, barrenness is the first of seven causes justifying divorce; and it is not a little singular, that in this nation of semi-barbarians, talkativeness is another cause equally valid. By the Koran, the process is, in many cases, very short; for if a wife is not pregnant, and at the same time does not menstruate for three months after marriage, the husband may put her away as barren. By the English and Scots law, sterility is a ground for divorce *a mensa et thoro*. It may, notwithstanding all these authorities, be justly questioned, how far barrenness alone can ever be an adequate cause for dissolving marriage. Besides the great difficulty of proving that a woman is altogether incapable of conceiving and bearing children, it is no better reason for divorce than any of the other visitations of Providence, many of which render the woman helpless, useless, and even loathsome; and yet in these cases, the laws of civilized society do not permit of a dissolution of the engagement more than they would sanction the practice which prevails in some nations, of knocking the aged and infirm on the head. By the mild precepts of the Author of Christianity, no divorce can be obtained for any cause but unfaithfulness to the marriage vow. See Vigarous, *Maladies des Femmes*; and Burns's *Principles of Midwifery*, &c. (*i*)

BARRERIA, a genus of plants of the class Syngenesia, and order Monogynia. See Bᴏᴛᴀɴʏ. (*w*)

BARRINGTONIA, a genus of plants of the class Monadelphia, and order Polyandria. See Bᴏᴛᴀɴʏ. (*w*)

BARROLOOS, the name of a tribe in Southern Africa, whose country has never been visited by any European. According to the testimony of a Hottentot, with whom Mr Truter conversed, the Barroloos are a good natured and ingenious people, who inhabit a district about ten days journey from Leetakoo, the capital town of the Booshuanas. Their towns are very numerous; and the largest of them is of such a size, that the length of it is a whole day's journey. Their houses he represented as better built, and their fields as better cultivated than those of the Booshuanas. Trees, shrubs, and rivers, decorated the surface of the country, while the soil was every where productive. They were said to be particularly skilful in carving wood and ivory; and the Hottentot had seen the furnaces by which they obtained iron from brown earth and stone, and copper from a grey earth. See Barrow's *Voyage to Cochin China*. (*π*)

BARROW, Iѕᴀᴀᴄ, an eminent theologian and a profound mathematician, was born in London, October 1630. His father, Thomas Barrow, merchant, was brother of the bishop of St Asaph, and nearly related to several other distinguished men. He received the earliest part of his education at the Charter-house, where he was remarkable only for inattention, slovenliness, and a most quarrelsome disposition. His father, who had destined him for a learned profession, was so discouraged by these untoward appearances, that he often wished, if Providence were ever to deprive him of any of his children, that it might be Isaac, from whom he promised himself no comfort. But having afterwards sent him to a school at Felsted in Essex, he soon perceived the dawn of his future excellence. At the age of fifteen, he was placed at Trinity College, Cambridge, where he was supported chiefly by the liberality of the learned Dr Hammond. His father's circumstances had been greatly reduced by his attachment to the cause of the unfortunate Charles I.; and young Barrow, who had imbibed the same loyal partialities, could not be prevailed upon, by any temptation of interest, to declare his adherence to the republican party. Yet, by his diligence, prudence, and candour, by the manliness of his principles, and the purity of his morals, he recommended himself to the esteem of the heads of the university, though little favour could then be expected by any who refused to subscribe the covenant. During his residence at the university, he applied with great eagerness to every branch of useful learning; but his chief attention was paid to the writings of Bacon, Galileo, Descartes, and the other reformers of philosophy. In 1649, notwithstanding the odium to which his loyalty exposed him, his indisputable merit obtained him a fellowship; and for some time after his election, being convinced that a man of his principles could have no opportunity of being useful in the church, he resolved to make physic his profession. For a few years, therefore, he applied to the study of anatomy, chemistry, and the other branches of a medical education; but after farther deliberation, he returned to the study of divinity, from which he conceived he could not withdraw, without violating the oath he had taken at his admission to a fellowship.

It is affirmed, that he was led to the study of mathematics by reading Scaliger on Eusebius. Perceiving that chronology is founded on the basis of astronomy, he began to read some works on this science; and foreseeing that his labour would be fruitless, unless he previously gained an acquaintance with the principles of geometry, he determined to make himself master of the writings of the ancient mathematicians. Not satisfied with improving his own mind by these exercises, to which he bent his attention with almost unprecedented perseverance, he prepared and published more correct editions of the works of Euclid, Archimedes, and Apollonius, than had hitherto been presented to the world. This, however, is not the whole extent of his merit. Though not of a genius so inventive as Newton, he made a near approach to some of that wonderful man's discoveries, and contributed in a very remarkable degree to enlarge the field of mathematical learning.

Barrow was recommended by Dr Duport, on his resignation of the Greek professorship, as the fittest person to succeed him; but, though his qualifications were universally acknowledged, his alleg
dency to Arminianism obstructed his advance
this occasion. In 1654, he travelled into
and had the happiness of administering to th
of his father, whom he found at Paris, in the
of the English court. From France he pr
to Italy, and resided for some time at Florence,
he perused many books and medals in the
duke's library. He was deterred by the plag
visiting Rome, and, in the end of the year 1
sailed for Smyrna. During the voyage, he
opportunity of signalizing his courage in a fie
obstinate engagement with a pirate. He r
in Turkey more than a year, and at Consta
he employed himself in reading the works o
sostom, formerly bishop of that see, and in
the institutions and manners of the people.
turned home by the way of Venice, Germa
Holland, and, soon after his arrival in Engl
was ordained by Bishop Brownrigg.

At the Restoration, it was expected that h
have received some mark of the royal favour,
sponding to his deserts; but, like many othe
had sacrificed their interest in the cause of loy
had the mortification of experiencing the m
neglect. His feelings on this occasion were
sed in the following lines:

Te magis optavit rediturum, Carole, nemo;
Et nemo sensit te rediise minus.

Soon after this period, however, literary
tions were rapidly bestowed on him by
judges of his merit. In 1660, he was electe
professorship of Greek at Cambridge. In 1
was appointed professor of geometry at
College; and in 1663, he was chosen, by Mr
executors, to fill the mathematical chair
bridge. In 1664, he resigned the Gresham
and was succeeded by the justly celebrated
bert Hook. In 1669, determining to confine
tention to divinity, he resigned his professo
Cambridge, in favour of Isaac Newton, the
27th year, whose marvellous attainments Barr
the first to celebrate and to reward.

After his resignation, he applied with gre
duity to the composition of sermons, though
not yet obtained any benefice in the church.
seven years before, he had been offered a
living, on condition of educating the patron
but he chose to decline a favour, burdened
stipulation which he thought simoniacal.
or 1671, his uncle, the Bishop of St Asap
him a small sinecure in his diocese, and the
of Salisbury gave him one of the prebend
church; both of which he retained only til
when, in his 42d year, he was made master
nity College, Cambridge. This promotion
entirely to the high opinion entertained of
the king, who said, he had bestowed it on
scholar in England; and his majesty's choice
proved by the almost universal suffrage of th
ed.

From this period he was engaged chiefly
tending to the interest of his college, and in
his theological works, particularly his elabora

he *Pope's Supremacy*. In 1676, he was
ellor of the university. On the 4th of
, he died suddenly of a fever, brought on,
eved, by the fatigue of preaching the pas-
n at Guildhall Chapel, in the city of Lon-
was buried in Westminster Abbey. In his
Barrow was below the middle size, and
er make, but remarkably firm and robust.
exion was fair, his eyes grey, his hair au-
rally very much curled; and it was re-
hat in his countenance there was a striking
e to that of Marcus Brutus, as it is repre-
ancient medals. He was always negligent
s, and immoderately addicted to the use of
but in every other particular, his appear-
eportment tended to ingratiate him with
w him. His conduct was uniformly amia-
ignified, his equanimity unruffled by the
the times, his moderation and candour un-
the controversies, ecclesiastical and politi-
ich he engaged. His understanding, clear
, was highly improved by the most exten-
ried reading; but his imagination, fertile
ant, was not sufficiently controuled by the
s of his judgment. He was intimately ac-
ith the fathers of the church, and appears
herited a share of their credulity. His
nd theological writings are contained in
mes folio. They display a great copious-
atter, and a still greater copiousness of
he vigour of the expression is more re-
han either its precision or its gracefulness:
guage, with all its faults, is often more
han his reasoning. His unwieldy and un-
eloquence frequently surprises, but seldom
He possessed the rare talent of being pro-
vous, and diffuse without any trace of im-
languor. But the discourses of Barrow,
from being faultless models of style, are
the more substantial praise of being ani-
ughout with the flame of piety and bene-
o that (to use the words of his friend Dr
" he must either be a perfectly good, or
ly bad man, that can read them over with-
the better for them."

the attention of Dr Barrow was principal-
to theology in the latter part of his life,
ematical writings have obtained him a high
g the philosophers of the 17th century.
nes Geometricæ published in 1669, are fil-
rofound investigations respecting the pro-
curvilineal figures; and in the method of
which he has explained in that work, we
cover the germ of the fluxional calculus.
ious method, which is a great simplifica-
rule given by Fermat, differs in nothing
ation, from the method of finding the sub-
the differential calculus. The optical lec-
r Barrow are distinguished by the same
ws which characterise his lectures on geo-
is beautiful theory of the apparent place
een by refraction, or reflection, and the
terminations which he has given of the
images of rectilineal objects received from
lenses, entitle him to the highest praise.
By pushing these researches a little farther, Barrow could not fail to have discovered the caustic, or Tschirnhausenian curves.

Besides his sermons, which are posthumous, the following works were published by him. Euclidis *Elementa, et Data*; Archimedis *Opera*; Apollonii *Conicorum*, lib. 4.; Theodosii *Sphærica*; *Lectiones Opticæ* 18; *Lectiones Geometricæ; Lectio de Sphæra; et Cylindro*; *Lectiones Mathematicæ*; *Opuscula Theologica, Poemata, Orationes*. (&)

Barrows.

BARROWS, are mounds of earth, generally of a conical form, which were raised, in ancient times, over the dead bodies of heroes, and persons of distinction. The natural desire of cherishing the remembrance of departed worth, has given rise, in all nations, to the custom of erecting monuments to perpetuate the names of those whose deeds had merited public gratitude or admiration, and to mark out to affectionate curiosity the spot consecrated by their ashes. The form, as well as the materials of these monuments, varied with the circumstances of the people who reared them, and particularly with their improvement in the arts; but the obvious and simple mode of heaping mounds of earth over the graves of the deceased, seems universally to have prevailed during that rude state of society, when the art of architecture was unknown. Accordingly, mounds of this kind are still to be found in all the quarters of the globe; and it is curious enough to trace, in these receptacles of the dead, the gradual progress of elegance and refinement, and the variations in the public taste. At first, perhaps, these barrows consisted of loose earth thrown upon the body, and gradually augmented, like the cairns in Scotland, by the casual contributions of pious passengers. The height of these barrows, being thus proportioned to the general reverence for the deceased, would be supposed to confer a corresponding distinction; the affection or the pride of individuals, would lead them to claim for their departed relatives, an honour at first bestowed by public favour; and the great and the wealthy would emulate each other in the magnificence of their family monuments. Hence, in Egypt, where magnitude was supposed to constitute grandeur, the simple cairn or barrow swelled in time to the dimensions of the stupendous pyramid. In Greece, the barrow long retained its original simplicity of form; though those of the rich and eminent were distinguished by the valuable and splendid urns which they enclosed. Homer, in describing the funeral ceremonies performed in honour of Patroclus and Hector, has given us an account of the construction of these barrows. We shall quote, from Mr Pope's translation, the description of the interment of Patroclus, which is somewhat more minute than that of Hector:—

> ——" Where yet the embers glow,
> Wide o'er the pile the sable wine they throw;
> And deep subsides the ashy heap below.
> Next the white bones his sad companions place,
> With tears collected, in a golden vase.
> The sacred relics to the tent they bore;
> The urn a veil of linen cover'd o'er.
> That done, they bid the sepulchre aspire,
> And cast the deep foundations round the pire;
> High in the midst they heap the swelling bed
> Of rising earth, memorial of the dead."
>
> Iliad, 23, 319.

In process of time, as the Greeks began to acquire a taste for magnificence, their barrows were decorated with the statues of animals, or with pillars bearing inscriptions in praise of the illustrious dead.

The Asiatic barrows, though less stupendous than the pyramids of Egypt, were sufficiently grand to excite the admiration of all who beheld them. One of the most famous of these was the tomb of Alyattes, king of Lydia, and father of Crœsus, which stands in the midst of several others, on the bank of the lake Gygæus, where the burial places of the Lydian princes were situated. The surrounding barrows are of various dimensions; some of them tower to such a height as to appear at a distance like hills; but they are all greatly overtopped by that of Alyattes, which, reared on a lofty basis about three quarters of a mile in circumference, rises to the height of 200 feet. All these barrows are covered with green turf, and still retain their conical form, without the smallest sinking in of their summits.

The savage tribes of America raise the same kind of monuments in honour of their dead. Mr Jefferson, in his Notes on the State of Virginia, gives a particular account of the opening of a very large barrow in his neighbourhood; which consisted of thick strata of bones, promiscuously strewed with alternate strata of earth. It is not ascertained on what occasion these barrows may have been made; but they differ from all others in this, that they are the general receptacles of immense numbers of dead bodies, and not the monuments of individuals. It seems probable that they were raised on the scene of memorable battles, and enclosed the bones of those who had fallen for their country. They are at least of considerable notoriety among the Indians; for Mr Jefferson informs us, that "a party of them passing about thirty years ago through that part of the country in which this large barrow is, went through the woods directly to it, without any instruction or inquiry, and, having staid about it some time, with expressions which were to be construed to be those of sorrow, they returned to the high road, from which they had deviated about six miles, purposely to pay this visit."

Innumerable barrows are scattered through various parts of England, but particularly in the downs of Wiltshire and Dorsetshire. Many of these have been opened, and found to contain skeletons, urns, ashes, beads, and other relics. In Scotland and Wales, the barrows are in general made of loose stones, and are known by the name of *cairns*. (See CAIRN.) But in the links of Sandwick, one of the Orkney islands, there are a great number of round barrows, some formed entirely of earth, and others of stones covered with earth. As these barrows generally contained two tiers of coffins, it is probable that they were family vaults, and that, on the death of any one of the family, the barrow was opened, and the body interred near its kindred bones. In Ireland, too, barrows are very numerous; and are supposed by Ledwich to have been of Scythian origin. Odin, the deity and legislator of the Goths, ordained that large barrows should be erected to the memory of celebrated chiefs: these barrows were composed of stone and earth, and their construction bespeaks amazing labour with no small
degree of art. The most remarkable monum
this kind to be seen in Ireland, is that at New G
in the county of Meath. It is founded on a va
lection of stones, covered with gravel and eart
base extends over two acres of land: it rises to the
of 70 feet; and is 300 feet in circumference
top. (For a more particular account of this
see NEW GRANGE.) Sepulchral monuments
same description as that at New Grange, are fr
in Denmark, Sweden, Russia, Poland, and the
of Tartary; and hence it has been conjectur
this mound is of Danish construction.

So much for the sepultural character of ba
But there is another no less interesting asp
which the British barrows at least are to be v
viz. as parts of an amazing system of vigilan
communication. "These barrows," says Mr
house, "are like as many mirrors, placed wit
optical skill and accuracy, that they conduct
sual ray from point to point, through all the wi
and recesses of those circuitous dells which th
evidently intended to overlook." We are in
by Cæsar, that the Gauls, from whom the
descended, conveyed intelligence with wonder
lerity through the fields and cantons, by sh
with all their might; thus the news was c
nicated from one to another, so that what ha
at Orleans at sunrise, was known at Auvergne
nine in the evening, though the distance is 16
(*De Bello Gallico*, lib. vii. cap. 3.) Mr Stac
conjectures, therefore, with great probabilit
persons must have been regularly stationed
express purpose of conveying tidings of any r
able event, otherwise these dispatches must ha
liable to continual interruption. To this p
and to a much more speedy communication, t
rows, constructed and arranged according t
ciples, which, after an attentive examination,
plainly detected, are most admirably adapted.
principles of their construction and position are
1st, They form intermediate points of *direct* c
nication, either between the castles and the b
(the extremities of the immense chain of vi
and defence,) or between the temples and the
castle. 2d, They communicate *reflectively* fr
to another through all the windings of tho
which intersect the downs. 3d, One or mo
rows are placed at the extremities of a lo
straight valley, so as to command a longitudin
of the same. 4th, Barrows are sometimes ra
the sides of these long dells, so as to command
al view of the opposite declivities. 5th, The
tude and position of each barrow is determi
the point to which its visual line is directed, a
as has been supposed, by its monumental d
the dignity of the person interred within it
Groups of barrows are uniformly limited to the
only; but eminent stations are occasionally
guished by one or two barrows, in parts of th
try to which the barrow system is not adapt
where, of course, they can only occur in
tached manner. 7th, A barrow is never foun
than its station, that is, the point to which it
line is assigned, requires. 8th, Where a barro
traordinary magnitude was necessary, no lab

been spared. 9th, Barrows are seldom found in low situations; but where a barrow is erected in a hollow or valley, it is almost always a very large one. 10th, The visual lines from the barrows on the summit of a ridge, often terminate at a distance from the foot, so as to leave room for a body of men to move along unseen: this is remedied by placing one or more barrows so as completely to command the whole range of the declivity at its base. 11th, The whole of these particular principles are concentrated into this general one, that there is not a single spot, within the barrow district, which is not exposed to at least one of these all-pervading points; and such is the perfection with which this great design is executed, that even a single individual could not proceed twenty yards in any direction without being seen, supposing the watch on these barrows to be set. The illustration of these principles is taken by Mr Stackhouse from the Dorchester Downs; and after walking considerably above a hundred miles among the barrows in the vicinity of Dorchester and Weymouth, he found it impossible to get wholly out of sight of them all, except in two or three instances, where the plough has completely levelled, or greatly depressed, the barrow assigned to that particular station. For further information on this subject, we refer our readers to Stackhouse's *Illustration of Tumuli or Ancient Barrows*; Gough's *Sepulchral Monuments of Britain*; Douglas's *Nenia Britannica*; King's *Munimenta Britannica*; *Philosophical Transactions*, No. 458.; *Archæologia*, vol. ii. and xii.; Britton's *Beauties of Wiltshire*, vol. ii.; and Clarke's *Travels in Europe, Asia, and Africa*, part i. p. 316, 428, &c. (μ)

BARRY, JAMES, a celebrated historical painter, was born in the city of Cork, on the 11th October, 1741. His father was a coasting trader between England and Ireland, and wishing to engage James, his eldest son, in the same employment, compelled him, when a boy, to make several voyages. But the active and expanding genius of young Barry could not be reconciled to the drudgery and uniformity of a sailor's life. On one occasion he fairly ran away from his ship; and in his future voyages, instead of learning to handle with dexterity the ropes and sails, was generally occupied, in sketching, with black chalk, the scenery of the coasts, or in drawing such figures as his fancy suggested. Convinced, therefore, that he would never become a good sailor, his father resolved at length to indulge his propensity for study, and to give him all the education which his native city could afford. Never, perhaps, was more unwearied industry displayed at such a tender age. Disdaining the childish amusements of his school-fellows, he employed all his moments of leisure in his closet, either studying with avidity some favourite author, or attempting to delineate with his pencil the various expressions and attitudes of the human countenance and figure. His slender allowance of money was saved for the purpose of purchasing candles, to enable him to prosecute his studies during the night; and when his mother, alarmed for the safety of the house, deprived him of his candles in order to force him to bed, he used to lock himself up in his room, and allow no person to enter on any occasion or pretext. The same turn of mind led him to court the society of men of education, whom he in general delighted by the unaffected eagerness of his curiosity, and the manly sedateness of his manner. He perused, with the most careful attention, the books which they recommended; and as his finances did not enable him to accumulate a large library, he generally made copious extracts from such authors as he admired, and sometimes even transcribed a whole work, however voluminous. The variety and extent of his attainments were such as might be expected from his fine genius, cultivated with such intense, though perhaps desultory application. His companions looked up to him as a prodigy of knowledge, and received his opinions with the reverence due to an oracle.

As his mother was a zealous catholic, her house was much frequented by priests of that persuasion, who naturally directed the attention of our young student to ecclesiastical history, and to the peculiar claims and doctrines of the church of Rome. To this circumstance we are to ascribe the strong bias, which he retained through life, for books of polemical divinity and church history, with which he acquired such an extensive acquaintance as would have done honour to the most learned divines.

None of his other studies, however, were allowed to interfere with his drawing, which had always been his favourite employment. No day was allowed to pass without some effort of his pencil. At a very early age, he furnished designs, and is supposed likewise to have assisted in etching the engravings for a book of fables, or tales, which was reprinted by an Irish bookseller. These designs would of course be rude and imperfect; yet, as they were the first of his public attempts, the book which contains them, were it possible to procure it, could not fail to be interesting to those, who take pleasure in tracing the progress of genius. He does not appear to have attempted oil painting before the age of seventeen; but from that period till his departure for Dublin in his 22d year, he had finished several large paintings, the subjects of which sufficiently mark his taste for the *great* style, which he afterwards cultivated with such ardour and success.* It was during the same period that he produced that picture, which first attracted public notice, and brought him on a theatre more worthy of his talents than the mercantile city of Cork. It is founded on an old tradition relating to the arrival of St Patrick on the coast of Cashel in Ireland. The monarch of that district, induced by the fame of the saint to investigate the truth of the religion which he preached, professes his belief, and is admitted to baptism. The king steps before the priest, who holds in his hand a crozier, armed at the lower extremity with a spear. In planting this crozier into the ground, he accidentally pierces the foot of his royal convert. Absorbed in the duties of his office, he remains altogether ignorant of the accident, and pours the water on the head of the monarch, who preserves, during the whole ceremony, the most unruffled serenity of countenance, to which the mingled emotions of his attendants afford a very powerful contrast. One of his guards prepares, with uplifted battle-axe, to strike the saint to the ground, but is restrained by another who points in admiration to the king: of the female attendants, some kneel in solemn reverence before the priest, and others tremble in anxiety for their sovereign. When Barry had embodied this story on canvass, he set out with it for Dublin, accompanied by a friend and school-fellow; and arrived in that capital on the eve of a public exhibition of paintings. Though without a single recommendation, he obtained leave to exhibit his picture; and had the satisfaction to hear it universally applauded. The superior advantages which the capital afforded for his improvement and encouragement as a painter, made him relinquish all thoughts of returning to his native city.

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* These subjects were, *Æneas escaping with his Family from the Flames of Troy*; *A dead Christ*; *Susanna and the Elders*; *Daniel in the Lion's Den*; *Abraham's Sacrifice*.

The most material advantage which he derived from his residence in Dublin, was his acquaintance with Mr Burke, to whom he was introduced through the kindness of Dr Sleigh, a physician in Cork, and a very enlightened amateur of the art of which Barry became so distinguished a master. In one of his first interviews with Mr Burke, an amusing incident took place, which could not fail to increase highly their mutual admiration and friendship. They were disputing on the subject of the arts as grounded on taste, when Barry, in opposition to Mr Burke's opinion, quoted the authority of a very able, though anonymous treatise, which had lately appeared. Mr Burke ridiculed the work as a mere theoretical romance, unworthy of attention, and useless as an authority. The contest became warm; and Barry's defence of this admired performance was rising even into rage, when Mr Burke, to appease him, acknowledged himself the author. Barry flew with transport to embrace him, and shewed him a copy of the Essay on the Sublime and Beautiful which he had been at the pains to transcribe.

After residing about eight months in Dublin, he accompanied some of Mr Burke's family to London; where he was introduced, through the recommendation of his distinguished friend, to the most eminent painters, and engaged in an employment, which, though not very dignified, at least afforded him the means of subsistence, and promised considerable professional improvement. That employment was to copy in oil colours drawings by Mr Stewart, the successor of Hogarth, better known by the name of Athenian Stewart. But to become a finished artist, it was necessary that he should study the works of the great Italian masters; and his generous patrons, Mr Edmund Burke, and his two brothers, provided him with the means of enjoying this essential advantage. Accordingly he set out for the Continent towards the latter end of the year 1765. During a residence of about ten months in Paris, he was very diligently employed in studying the best works in the various collections which that city contains, and in drawing after living subjects in St Luke's academy. From Paris he proceeded to Rome, where he continued nearly five years.

His mode of study, during his residence in that great emporium of the arts, was very different from the course generally pursued by young artists who resort thither for improvement. With an imagination capable of conceiving and of relishing whatever is grand and beautiful in art, he contemplate most enthusiastic admiration, the noble sp both, which he found in the antique statues works of Michael Angelo, Raphael, and Tit inimitable models so completely occupied tion, that, in one of his letters to Sir Joshua he informs him, that for near three years he employed himself for two hours on any except some little things of his own invent piece of a figure of a Magdalen by Anniba From these he endeavoured to exalt and ideas of perfection in painting; and to spirit which they breathed without con often to the mechanical drudgery of cop should be disposed, perhaps, to regret his time was not devoted to his pract ment in the art, were we not convinced masterly criticisms which he has mad the paintings which he studied, and rules which he has deduced from them more valuable legacy to future artists finished productions, which, with the tion to mechanical execution, his pencil have produced.

Soon after his arrival in Rome, he was e in keen hostilities with the *Cicerones*. The tempt which they expressed for English artists, of whom were his particular friends, offend once his private feelings, and his national pride temper, naturally irritable, was often inflam rage, in the defence of his opinions, which, generally correct, were frequently singular; the knavery of the traffickers in antiquity, con ly employed in duping his countrymen, drew him the most passionate expressions of indign He became of course an object of general h to all the artists who resided at Rome; and imagination was continually haunted with the of conspiracies formed to injure and depres By the mild and judicious remonstrances of his fri in London, he appears to have been in some m restored to his temper and to peace; for in o his letters we hear him say, that he spent time agreeably with those whom he had form garded with so much rancour and apprehension.

On his return to England in 1771, he determi distinguish himself by some masterly production, might at once establish his fame as a painter. subject which he chose was Venus; and the immediately recognized his amazing powers i bodying the most exquisite ideas of beauty and Next year he produced a picture of Jupiter an on Mount Ida, which was received as a fine specimen of his talents for the great style. choice of his next subject, the death of G Wolfe, he was extremely unfortunate: for how he expect to succeed in painting figures in t dern *costume*, which he had always affected spise, as disguising the human form? The con tempt for the stiffness of modern dress render extremely averse to portrait painting, which sidered, at any rate, as but an inferior branch art; but this can never apologise for his ingratit incivility to his steady friend and patron Mr Dr Brocklesby had expressed a desire to have a of that gentleman painted by Barry; and Mr to gratify a friend whom he very highly respected, had presented himself for a sitting to Barry at every leisure moment which he could command for near two years. Barry constantly refused or evaded his request, either pretending some indispensible engagement, or alleging that he could not begin the portrait without at least one day's previous intimation. In palliation of this ungracious conduct, it has been said, that "a kind of ill humour had at that time possessed Mr Barry, in consequence of the extreme intimacy of the Burkes with Sir J. Reynolds, which led him to suppose that these friends overlooked his merits to aggrandize Sir Joshua's." This intended apology serves only to aggravate his offence. For surely if he could permit such a trifling circumstance to counterbalance for a moment his numerous obligations to the Burkes, he proved himself very unworthy of their kindness. Mr Burke naturally felt some resentment on the occasion, but conducted himself with a degree of prudence and moderation highly honourable to his character. After a mutual explanation, the affair was adjusted; and Barry, to make some atonement, finished the portrait in a style which proved that he needed only to apply his talents to portrait painting, to attain the highest eminence in that line.

His chief ambition, however, was to be engaged in some great public undertaking; as if emulous of the Italian masters, whose fame is in a manner identified with the celebrity of their grand national edifices. He therefore entered with eagerness into a proposal made to him, in conjunction with other artists, for decorating with paintings the interior of St Paul's. To his great mortification, the scheme was relinquished for want of the consent of the archbishop of Canterbury and the bishop of London. Another prospect soon opened, equally flattering to his ambition; for a proposal was made to the same artists, for ornamenting with historical and allegorical paintings the great room of the Society for the encouragement of arts, manufactures, and commerce in the Adelphi. The proposal was rejected by the artists themselves, and Barry was again disappointed.

During his residence in Rome, he had often been insulted and provoked by hearing the inability of British genius for the higher works of art, asserted and maintained from the authority of Montesquieu, Du Bos, and Wincleman. He therefore employed the leisure which his disappointments now gave him, in drawing up an "Inquiry into the Real and Imaginary Obstructions to the Acquisition of the Arts in England," which he published in 1775. In this able work, he very successfully confutes the absurd theories of the above-mentioned writers concerning the influence of climate; and proves, from the history of the fine arts in Greece and Italy, that they flourish and decay, not according to the serenity or cloudiness of the sky, but as the moral feelings of the people are refined or depraved: to account for their slow progress in our own country, he reminds us, that when the rest of Europe was recovering a taste and feeling for the beauties of painting and sculpture, England was thrown out of the sphere of their attraction by the destructive fury of the reformers, by political revolutions and civil dissensions, and by the general turn of the public mind to mechanical inventions, to trade, manufactures, and commerce. He presented the treatise to Mr Burke, who, instead of receiving it with cold civility, as an illiberal critic has very injuriously asserted, (see the 32d number of the *Edinburgh Review*, art. 2.) returned the author a warm and flattering acknowledgment "for his early communication of his most ingenious performance, throughout the whole of which there are many fine thoughts and observations, very well conceived, and very powerfully and elegantly expressed."

As he had pledged himself in this enquiry for the capability of British genius to excel in the fine arts, he was anxious to redeem the pledge by some production of his own. He therefore undertook to execute by himself the paintings for the great room of the Society of Arts, on condition that he should not be interfered with, in the choice and prosecution of his subjects. The history of painting cannot afford an example of nobler and more disinterested ambition. When he made this proposal, his whole property amounted to only sixteen shillings; and during seven years of intense labour on this grand undertaking, he was obliged to earn the means of a scanty subsistence, by etching at night designs for the print-sellers, after being fatigued with painting all the day. Of the general design and particular subjects of these paintings he has published a full explanation, to which we refer our readers. We shall merely mention, that they consisted of a series of six pictures, intended to illustrate the dependence of public and individual happiness upon the cultivation of the human faculties. Beginning with man in his savage state, full of inconvenience, imperfection, and misery, he carries him through the several gradations of culture and happiness, which, after our probation here, are finally attended with beatitude or misery. The first picture represents the story of Orpheus; the second a Harvest-Home, or thanksgiving to Ceres and Bacchus; the third, the Victors at Olympia; the fourth, Navigation, or the triumph of the Thames; the fifth, the Distribution of Premiums in the Society of Arts, &c.; and the sixth, Elysium, or the state of final retribution. When these paintings were finished, the society expressed their satisfaction by granting him two exhibitions, and voting him at different periods fifty guineas, their gold medal, two hundred guineas more, and a seat among themselves. The clear profits of the exhibitions amounted to upwards of £500, and he received besides several handsome remunerations for portraits which he had copied into some of the pictures. The paintings excited the admiration of all who were qualified to judge of their merits. Jonas Hanway, it is said, on quitting the room, demanded his shilling, and left a guinea in its place as a payment more adequate to the pleasure which he had received. And Dr Johnson observed, that there was a grasp of mind displayed in them which could be found no where else.

The remaining incidents in Barry's life are only worth recording, as they serve to illustrate a truth, which cannot be too frequently inculcated, that moroseness of temper, and rudeness of manner, will always present an insuperable bar to the success of talents however splendid, and accomplishments how-

Barry.

ever distinguished. We find Barry elected professor of painting in the royal academy; yet quarrelling with every one of his associates, accusing them of cabals and conspiracies against him, holding them up to the ridicule and detestation of his pupils, and at length attacking them publicly in an intemperate invective, which reduced them to the necessity of thrusting him from his chair—a chair which, with more temper, he might have filled with the highest honour to himself, and advantage to the art which he professed. We find him, after the pre-eminence of his genius had been universally acknowledged, deprived of almost every friend, sunk in the lowest indigence, scowling with malignity on mankind, whom he in general regarded as active enemies, and stung with the keenest torments of disappointed expectations, and mortified pride. To such a frantic height did his fear of conspiracies reach, that he would not keep a servant, lest the active malice of his enemies should employ her as an instrument for his destruction. His house presented a picture of the most complete wretchedness; its walls sunk, and its windows broken; without even a bed that deserved the name; dirty, gloomy, and cold. Such a house seemed to offer but little temptation to plunderers; yet it was twice broken into, and robbed of several hundred pounds. The loss was made up to Barry by the munificence of the Earl of Radnor, and two gentlemen of the name of Hollis; but still his capital was too small to enable him to procure a more comfortable mansion. He had planned and begun a series of paintings to represent the progress of theology; but his narrow circumstances, and the want of proper accommodation, prevented him from proceeding with this design. In this situation he attracted the attention and pity of the Earl of Buchan, who set on foot a public subscription on his behalf, as the best mode of relieving his necessities without wounding his pride, which would probably have spurned at the idea of accepting any boon from individual benevolence. The subscription when closed amounted to about a thousand pounds, with which the friends of Mr Barry had just purchased an annuity, when their benevolent exertions were rendered useless by his death, which happened on the 22d February, 1806.

As an artist, Barry was distinguished by the grandeur of his conceptions, and the general magnificence of his designs. Glowing with the enthusiasm of genius, and impressed with an early conviction of the paramount importance of his art, he pursued, with indefatigable ardour, whatever could be made even remotely subservient to his professional improvement. He beheld the face of nature with the exquisite rapture of a poet; and while he contemplated its magnificent or tranquil scenes, felt his mind expand with the finest conceptions of grandeur and of beauty. He read, with all the interest of a kindred mind, the works of our most classical bards, and had completely digested and appropriated whatever was most pleasing or exalted in their descriptions. But his favourite study was history, which presented to his discriminating eye, all the varieties of character, action, and passion, and furnished valuable hints for his direction in the high style of historical painting. The monuments of Grecian sculpture, which he contemplated in Italy with almost idolatrous admiration, led him to the study of mythology, in which he acquired the skill and taste of an accomplished critic. And his early education, aided by the religious subjects of the Italian paintings, gave his mind so strong a bias for theology, that there was scarcely a fact in its history with which he was not acquainted. All these accomplishments were considered by himself as mere auxiliaries to his art; and their advantage is sufficiently apparent in his paintings, which, however deficient in correctness and execution, are allowed by all to be almost unrivalled in the sublimity of idea, and vast reach of thought expressed in their design. But his varied acquisitions appear with still more admirable effect in his writings, which contain more acute and able criticisms on the various styles and productions of the great masters in painting, and more judicious rules for the practice of that art, than any work of the same kind that has ever been given to the world. How much is it to be regretted, that such an artist had not been enabled, by the independence of his circumstances, to follow out, without distraction, his own magnificent ideas; or that the sternness and irritability of his temper prevented him from reaping the full advantage of his superiority! In justice to his character, however, we must observe, that though thus repulsive and irascible, he was by no means deficient in the better qualities of the heart. He was susceptible of the warmest friendship; and had not his mind been soured by dependence and misfortune, might have been a cheerful and engaging companion. His honesty, his candour, and his sincerity, were proverbial; and his desires were so moderate and well regulated, that he could submit, without repining, to privations, which few men in polished life could even sustain.

His principal paintings were, a picture of Adam and Eve, Venus, Jupiter and Juno, and the paintings in the great room in the Society of Arts. His writings are, Lectures on Painting; Observations on different Works of Art in France and Italy; Fragment on the Story, and Painting of Pandora; An Inquiry into the Real and Imaginary Obstructions to the Acquisition of the Arts in England; A Letter to the Dilettanti Society; An Account of a Series of Pictures in the Great Room of the Society of Arts, &c.; A Letter to the President, Vice Presidents, and the rest of the Noblemen and Gentlemen of the Society for the encouragement of Arts, &c. See the *Works* of the late James Barry, Esq. with a sketch of his life prefixed. (*k*)

BARSALLI, a kingdom of Africa, on the river Gambia, inhabited by the Jaloffs. This kingdom not mentioned by Durand, in his enumeration of the different kingdoms on the north and south banks the Gambia, and must therefore be included in some other state. See an account of Barsalli in the *Mod. Univers. Hist.* vol. xiv. p. 104. See also Durand *Voyage to Senegal*, chap. iv. (*w*)

BARTER, or BARTAR, in Arithmetic, is the method of finding the value or quantity of one commodity which is to be given in exchange for another. Questions of this kind are solved either by the Rule of Three, or Practice.

Exam. 1. How many yards of broad-cloth at 17s. 6d. per yard must be given in exchange for 360 yards of linen at 3s. 6d. per yard?

Since the value of the two commodities is supposed be equal, it is evident that we must first compute e value of 360 yards at 3s. 6d. per yard, and then d how many yards, at 17s. 6d. per yard, can be rchased for the amount.

```
d. Yds.    Sh.        Sh.     Sh.   Yds.
1 : 360 : : 3.5       17.5 : 1260 : : 1
            360                 1
          ------            ------
           2100       17.5)1260(72 yards
          105               1225
          ------            ------
          1260 Sh.           350
                             350
                            ------
```

The above question might also have been solved one stating, thus:

```
     Sh.     Sh.      Yds.   Yds.
     17.5 : 3.5 : : 1260 : 72
```

nce it may be inferred, in general, that if the ntity of one commodity be multiplied by its rate, product, divided by the rate of the other comity, will give its quantity.

r. 2. At how much per pound was cotton rated n 1036 lbs. of it were exchanged for 6 cwt. 3 qrs. b. of sugar, at £2, 16s. per cwt. and £21 : 11 : 8 money ?

```
              | Cwt. qr. lb.    £  s.
              |  6   3   21 at 2 16
              |-----------
  £2          | 12
     16s.     |  4 16
      2qrs.   |  1  8
      1 qr.   |    14
     14 lb    |     7
      7 lb    |     3 6
               ---------
               19  8 6 value of the sugar
               21 11 8 in money
               ---------
               41  0 2

    lbs.  lb.     £ s. d.
    1036 : 1 : : 41 0 2
                  20
                -------
                 820
                  12
                -------
          1036)9842(9½d. per lb
                9324
                -------
                 518
                   4
                -------
          1036)2072(2
                2072
                -------
```

(A)

ARTHELEMY, Jean Jaques, a French Abbé, nently distinguished by his literary attainments and ues. He was born in Jan. 1716 at Cassis, a small port in Provence. Being destined for the church, was sent at twelve years of age to study at Marilles, where he was admitted into the college of e oratory, under the tuition of father Renaud, a an of learning and taste, who became warmly attached to his young pupil. It became necessary for him, however, to quit this seminary, on account of an ordinance of the bishop of Marseilles, by which students of the oratory were refused admission to holy orders. With much regret, therefore, Barthelemy was obliged to quit his esteemed preceptors, and to betake himself to the study of philosophy and theology under the Jesuits.

Barthelemy.

Dissatisfied, however, with the plan adopted by his new masters, he determined to follow a method of his own, in private; and applied to the study of the ancient languages, as well as of the Hebrew, Chaldean, and Syriac, with such indefatigable perseverance, that it had nearly cost him his life. Having recovered from a dangerous illness, brought on by too intense an application to study, he at length entered the seminary, where he received the clerical *tonsure*. Here he made such progress in the study of Arabic, by the assistance of a young Maronite, who had been educated at Rome, that he was able to deliver some sermons in that language, composed by a Jesuit belonging to the *Propaganda*, to an assembly of Maronites, Armenians, and other Catholic Arabians, then at Marseilles. He also gave another uncommon specimen of his proficiency in the oriental languages; for, at the age of twenty-one, at the request of some of the principal merchants of Marseilles, he, with great applause, conducted a learned dialogue, with an itinerant Jewish rabbin, who had become a professor of the Christian religion, and claimed to be deeply skilled in the languages of the East.

Having finished his studies at Marseilles, Barthelemy retired to his family at Aubagne; but was accustomed to repair occasionally to his former residence, in order to enjoy the society of the academicians, and other learned men residing there. Among those to whom he more particularly attached himself, was a M. Cary, the possessor of a valuable collection of books, and fine cabinet of medals; so that now he laid the foundation for that knowledge and taste in antiquities for which he was afterwards so justly celebrated. It was in 1744 that Barthelemy repaired to Paris, with a view of devoting himself entirely to literature. He was furnished with a letter of introduction to M. de Boze, keeper of the royal cabinet of medals, and perpetual secretary to the academy of inscriptions and belles lettres. By this eminent antiquarian he was warmly patronised, and introduced to the acquaintance of the most distinguished members of the three academies, who dined twice a week at his apartments. In such society the taste and knowledge of Barthelemy could not fail to be materially improved.

In consequence of the declining health, and increasing age of M. de Boze, an associate became necessary to aid him in the labour of completing the royal cabinet of medals; and Barthelemy was selected for this office, in preference to M. Bastie, a learned member of the academy of inscriptions. From this moment he devoted the whole of his attention and care to the elucidation of that branch of study which had now become his official employment. In 1747, he succeeded M. Burette as associate to the academy of inscriptions; M. le Beau, who had been a candidate, declining a competition with so eminent an antiquarian. When he was afterwards nominated by the minister to be secretary to the academy, he waved the nomination in favour of M. le Beau, as an acknowledgment of his former liberality. In return, M. le Beau, on resigning this office, gave his interest to Barthelemy, who was appointed his successor; and thus did these distinguished rivals vie with each other in the exercise of a liberality which reflected equal honour upon both. On the death of M. de Boze in 1753, the Abbé Barthelemy succeeded him as principal keeper of the medals; and during this interval, he had enriched the memoirs of the academy with several valuable papers relative to ancient monuments; and, in particular, an interesting dissertation on the inscriptions found at Palmyra by the English travellers.

At this period Barthelemy was particularly patronised by M. de Stainville, afterwards better known under the title of the Duc de Choiseul. This gentleman, as well as his lady, who was young and beautiful, were great admirers of the fine arts, and found in Barthelemy a man of letters, in whose conversation and manners they enjoyed a constant gratification. In 1754, M. de Stainville having proceeded with his family to Rome, in the capacity of ambassador, was followed by Barthelemy, who was distinguished by the particular notice of Benedict XIV., who then wore the tiara, and was himself an accomplished scholar. From Rome the Abbé proceeded to Naples, then rendered peculiarly interesting to antiquarians by the recent discovery of the subterranean treasures of Pompeii. In the museum of Portici, amidst numerous interesting remains of antiquity, the attention of Barthelemy was peculiarly attracted by the manuscripts rescued from the ruins of Herculaneum; of which four or five hundred had been recovered; but all of them remained in their original forlorn state, except two or three that had been unrolled, and commented upon by the learned Mazocchi. Barthelemy used his most strenuous efforts to engage the Neapolitan court to expedite the examination of the remaining manuscripts; and succeeded in persuading the Marquis Caraccioli to enter into his views; but this desirable object was frustrated by the death of that minister a few years afterwards.

Barthelemy was also extremely desirous of presenting the learned men in France with a specimen of the ancient writing employed in the Greek manuscripts. He was informed, however, by the guardians of the treasures at Portici, that they were expressly enjoined to communicate nothing. On this Barthelemy solicited permission to look, for a few minutes only, on a page of a manuscript which had been cut from top to bottom since its discovery. It contained 28 lines, which our antiquarian read over six different times with extreme attention. He then retired to a corner, and transcribed the precious fragment from memory; after which he again examined the manuscript in order to render his copy more correct. Having by this stratagem rendered himself master of a *fac-simile* of the MS. which related to the persecution of the Greek philosophers, during the time of Pericles, he immediately transmitted his literary plunder to the academy of belles lettres, with an injunction of secresy, in order that the keepers of the museum might escape from blame. On his return to Rome he acquired great applause for a new and ingenious explanation of the famous Mosaic at Præneste, or Patestrina, which, according to him, related not to Sylla but to Adrian.

In 1757 we find Barthelemy escorting the lady of M. de Stainville to Vienna, at which court that gentleman had been appointed ambassador. Here he had the self-denial to refuse an offer of his friend and patron to procure him permission to visit Greece and the ports of the Mediterranean, at the king's expense; because he conceived it inconsistent with the calls of his duty at Paris, as custodiary of the royal medals. When in 1758 M. de Stainville was nominated minister for foreign affairs, and became Duc de Choiseul, he immediately exerted himself to provide for Barthelemy, for whom he procured pensions to a considerable amount, and among others an annuity of 5000 livres on the Mercury. The Abbé himself had the modesty to name 6000 livres a year, as the sum that would make him easy for life. But before M. de Choiseul was obliged to retire from power in 1771, his income amounted to £1200 sterling per annum, of which, however, he distributed more than a fourth part among indigent men of letters. He also educated and established three nephews, one of whom afterwards made a considerable figure on the stage of revolutionary politics as a member of the directory; and appears to have inherited many of the virtues and talents of his ancestor. He at the same time supported his relations in Provence, and selected a noble library, which he was obliged to dispose of some time before his death.

When the Duc de Choiseul was disgraced and banished to his seat at Chanteloupe, in order to make way for his enemy the Duc d'Aiguillon, Barthelemy became the companion of his exile, and offered the resignation of his secretaryship of the Swiss guards, because his patron's commission as colonel-general was demanded from him. An arrangement, however, was made, by which the Abbé's revenue received no material diminution; and thus for twenty years of his life he enjoyed a state of literary affluence. In advanced age, however, he found himself reduced, by the suppression of places and pensions, to mere necessaries; but he supported this reverse of fortune with the greatest equanimity and good humour; and was never heard to complain, nor did he even seem to perceive the change.

In 1788 appeared his celebrated work, entitled *Voyage du jeune Anacharsis en Grece, dans le milieu du quatrieme siecle avant l'ere Christienne*, which had occupied his leisure hours during an uninterrupted succession of 30 years; and in 1789 he became [illegible] candidate for a chair in the French academy, [illegible] which, in consequence of his high reputation, he [illegible] elected by general acclamation. In the following year he declined an offer of the place of librarian [illegible] the king, apprehensive that it might interfere with his literary occupations, and his labours in the cabinet of medals, in which he had now got an useful associate in his nephew Barthelemy Courcy, who was conjoined with him in the office in 1768.

At that gloomy period of the French revolution, when virtue and talents were proscribed and persecuted, the age, declining health, and long services of Barthelemy, could not save him from the suspicions and insults of the wretches then in power. On the

ıst 1793, a warrant of apprehension was
him and his nephew; and on the 2d of
e officers of justice made intimation of
bbé, who happened to be then at the
lame de Choiseul. With the greatest
mmediately submitted to the order, and
d to the Magdelorettes, where he found
efore him. His imprisonment, however,
ng duration; for on the representation
Madame de Choiseul, orders were issued
ion in the course of that very evening;
the singular composure of his mind,
warrant for his delivery arrived, he was
enjoyment of a profound repose. He
r offered the place of national librarian,
paration, it should seem, for this unmerit-
; but his increasing infirmities were a
ogy for his refusal.

was gradual, but seems to have been ac-
he rigorous winter of 1795. After a
nent, he expired on the 30th of April of
hout any struggle, and apparently with-
ing any pain. He retained his faculties
ment; and only a few hours before his
aged in reading his favourite Horace,
became so numbed that they could no
rt the book. Thus died, in the 80th
e, the Abbé Barthelemy, whose virtues,
fine taste, entitle him to be considered
ornament of the age in which he lived.
n his person and countenance, to have
ch of the noble and simple character of
which it was his chief delight to study;
admirably sculptured by Houdon, has an
it entitles it to stand by the side of that
enocrates.

cabinet of medals was greatly enlarged
ed under the superintendance of Barthe-
onfined his inquiries almost entirely to
ntiquity, considering modern medals as
ery subordinate importance. He found
about twenty thousand ancient medals,
no less than forty thousand; having, at
s, examined, as he declared to a friend,
n four hundred thousand ancient coins.
of miscellaneous pieces of the Abbé Bar-
ared at Paris in 1798, in 2 vols. 8vo.;
find, among other interesting perform-
ant and classical tale, entitled *Carité and*
which the fable relates to that period
story, when the Athenians were subject-
l and disgraceful tribute of an annual
ths and virgins, to be devoured by the
Crete. But by far the most important
r of Barthelemy was his *Travels of the*
arsis in Greece, which, as we have said,
oyment of his leisure hours for thirty
young Anacharsis is a supposed son of
sage of the same name, and is represent-
Greece, in the year 363 B.C. in order
elf acquainted with the arts, the litera-
ent characters of that celebrated coun-
e most brilliant era of its history. The
n fixes his residence at Athens, whence
ursions, not only to the other Grecian
cities, but also to Egypt, Asia Minor, Persia, and the islands of the Ægean Sea. He becomes familiar with Plato, Aristippus, Epaminondas, and every other illustrious character of the age; and gives minute details of the prevailing systems of philosophy, forms of political administration, models of the fine arts, and every other particular that is likely to be interesting in the internal economy of the Grecian states. The narrative of Anacharsis is addressed to Arsames and Phedime, a Persian satrap and his lady, whose characters are meant as portraits of the Duke and Duchess of Choiseul; and the authority of the most approved ancient writers is uniformly quoted for every fact and detail, that makes a conspicuous figure in the work. Thus, under the form of an ingenious fiction, Barthelemy has contrived to produce a most instructive commentary on his favourite subject, the antiquities of Greece; and by the elegance of his style, the liveliness of his narrative, and the justness of his reflections, he has rendered his work attractive to the unlearned, as well as to the learned reader. An introductory discourse is prefixed, in which a rapid, but luminous, view is given of the previous periods of Grecian history; and maps and engravings are annexed, together with a variety of useful tables, in order to render the work completely illustrative of the geography and antiquities of ancient Greece. The great estimation in which this work is held, has been proved by the variety of editions, as well as translations into different languages which it has undergone; but it is perhaps to be regretted, after all, that the learned author has so completely fettered himself by the authority of ancient writers, that he has on no occasion given the reins to his imagination, or assigned any fictitious adventures to his hero Anacharsis, by which the attention of the reader might be occasionally relieved, and a greater appearance of reality conferred upon the whole. The young Anacharsis is, in fact, a completely inanimate picture, and interests the reader in no other manner, than as the connecting vehicle, by which, whatever relates to the arts, science, or literature of ancient Greece, is digested into one harmonious whole. It was suggested, soon after the appearance of the travels of the young Anacharsis, that the hint of the work was taken from a book published at Cambridge, under the title of *Athenian Letters*, and consisting of the imaginary correspondence of a set of Grecians, the supposed cotemporaries of Socrates, Pericles, and Plato. This, however, the Abbé Barthelemy expressly denied to M. Dutens; assuring that gentleman that he had never heard of the *Athenian Letters* till after the publication of his work. Were it necessary to seek for a model that might have suggested this celebrated production, we should have been more disposed to select the *Travels of Cyrus* of the Chevalier Ramsey, than the *Athenian Letters*. (*m*)

BARTHOLINE, Thomas, a celebrated Danish anatomist, was the second son of Caspar Bartholine, a learned clergyman at Melanoe in Sweden, and the author of numerous works on medicine and natural history. He was born at Copenhagen in the year 1616, and after receiving his classical education in that city, he travelled through the greater part of Europe. From Leyden, where he began his medical

Bartholomew.

studies, he went successively to Paris, Montpellier, and Padua. After an absence of eight years, he returned to Copenhagen; and from thence he went to visit Basle, where he was honoured with the degree of doctor of medicine in 1645. The first public situation which he held was the professorship of mathematics at Copenhagen, from which he was translated, in 1647, to the chair of medicine, which he filled with great credit to himself, and with great advantage to the science. Nearly at the same time with Jolliff and Olaus Rudbeck, he discovered the lymphatics while dissecting the bodies of live dogs, and he perceived the same vessels in the liver of a fish. (See *History of* ANATOMY). Fatigued with the duties of a public life, he retired, in 1661, to his estate at Hoggestatt, where he continued nine years, prosecuting with ardour his favourite studies. By some unfortunate accident, his house caught fire in the year 1670, and the whole of his manuscripts and valuable library being completely consumed, he was compelled to resume the active labours of his youth. The king of Denmark created him his physician and aulic counsellor; and he was appointed chief inspector of the library of the university. These new appointments, and the sympathy of his numerous friends and correspondents, soon consoled him for his heavy loss, and stimulated him with the utmost zeal for the prosecution of his labours. He died in the year 1680, leaving behind him a family of five sons and three daughters.

His principal works are, *Anatomica Aneurismatis dissecti historia*, Panormi, 1644, 8vo. *De Angina puerorum Campaniæ, Siciliæque epidemica*, Neapoli, 1646, 8vo. *De Luce Hominum et Brutorum, et de raris et admirandis herbis quæ noctu lucent*, Leidæ, 1647. *Vasa lymphatica, nuper Haffniæ in animantibus inventa, et in homine*, Haffniæ, 1653, 9to. *Catalogus operum Suorum, hactenus editorum, extat cum observationibus variis de nivis usu medico*, Haffniæ, 1661, 8vo. *Domus Anatomica Haffniensis*, 1662, 8vo. *Centuria Quatuor epistolarum Medicarum*, republished at the Hague in 1740, in 5 vols. 8vo. *De insolitis partûs humani viis*, Haff. 1664, 8vo. *Historiæ Anatomicæ*, Cent. vi. *Acta Medica et Philosophica Haffniensis*, 4 vols. 9to.—See Vander Linden *De Scriptis Medicis*. Haller *Biblioth. Anatom.* and the *Biblioth. Med. Pract. et Chirurg.* (q)

BARTHOLOMEW, an Apostle, and a name which signifies the son of Tholomew. That it was customary, among the Jews, to name their children in this manner, appears from Bartimeus being interpreted *the son of Timeus*, Mark x. 46.; and Simon Peter, who is called Bar-jona, Matt. xvi. 17., is in John xxi. 15. named Simon *son of Jonas*.

It is generally believed, that Bartholomew is the same with Nathanael, the one his proper, the other his patronymical name; and it is well known to have been customary, among the Jews, to give several names to the same person. In support of this opinion, the following circumstances may be adduced. As John is the only evangelist, who makes mention of Nathanael, so he never speaks of Bartholomew, which it is probable he would have done, had they not been one and the same person. When the twelve apostles are
named, Philip and Bartholomew are invari
together; and, as Philip was the person
brought Nathanael to Jesus, it is highly
that Bartholomew is the same person who
called Nathanael. When our Lord appe
his resurrection, to several of his disciples
of Tiberias, Nathanael is mentioned among
ber; and all the rest named upon that occ
apostles. (*John* xxi. 1, 2.) From those circ
it is more than probable, that Nathanael
the apostles, and that he is the same wi
lomew.

In the New Testament no mention is m
station or employment, except that he ac
Simon Peter, and others, when they went
on the sea of Tiberias. Several of the ea
of the church tell us, that he was of Cana
(as was also Nathanael,) and that he wa
the law. Eusebius says, that he preached C
with great success, in India; and that
thither St Matthew's gospel in Hebrew,
preserved in that country with great care,
valuable treasure. From thence he wen
more northern and western parts of Asia,
Lycaonia, and at last came to Albanople,
the greater Armenia. Having convertec
and queen of that country to Christianity,
persuaded many of the people to relinc
idolatrous worship, the priests were
against him, that they prevailed upon
brother to deliver him into their hands;
him first to be flayed, and then beheaded, o
See Cave's *Lives of the Apostles*; August
in Joan. vii.; Euseb. *Hist.* l. v. c. 10. (

BARTHOLOMEW, SAINT, one of
Caribbee islands in the West Indies, situa
north of St Christophers. This island, whi
24 miles in circuit, was peopled by the
1648. It fell into the hands of the Englis
but was restored to France by the treaty of
It was ceded in 1785 to the Swedes, to wh
belongs. Though the soil is rather poor, i
cotton, the plantations of which have been
cessful, tobacco, cassava, and various kinds
A peculiar sort of limestone found here i
to the neighbouring islands. The princip
are cotton, lignum vitæ, drugs, and iron
it is supplied from America with flour, drie
fresh and salt provisions. Gustavia, the or
the colony, is inhabited by Swedes, Englis
Danes, and Americans: The houses are mad
and many of them built on stone pillars.
harbour in the island is Le Carenage near
It contains about 100 vessels, but though th
are excellent, it will admit only such vesse
below nine feet of water. West Long. 62°
Lat. 17° 53′. See *A Voyage to St Ma*
undertaken at the Expense of the Academy
at Stockholm. (*j*)

BARTSIA, a genus of plants of the
namia, and order Angiospermia. See Bo

BARYGAZAH. See BAROACH.

BARYTES. See CHEMISTRY *Index.*

BASALT, a species of the trap fa
GEOGNOSY and ORYCTOGNOSY. (*r*)

BASE, in Anatomy, a term used by anatomists in a very vague manner in their descriptions of the animal body. Sometimes it refers to situation in respect of some other part, as *the* base *of the cranium*, *i. e.* its lower part in the usual attitude of the human body; *the* base *of the brain*, or that part of the encephalon which rests on the lower part of the cranium. Sometimes it is employed to denote a certain side of a triangular organ, as *the* base *of the scapula*, *i. e.* that side which is next the spine; *the* base *of the heart*, or that side opposite the point or *apex*. (*f*)

BASE. See CHEMISTRY, GEOMETRY, and MUSIC.

BASELLA, a genus of plants of the class Pentandria, and order Trigynia. See BOTANY. (*w*)

BASHAW, or more properly PACHA, a person appointed to the government of a province, district, or city, within the dominions of the Grand Seignior. When the successive conquests of the sultans had rendered their empire too extensive to be controuled by their own immediate vigilance, they entrusted the government of the remote provinces to viceroys, who might enforce the imperial mandates, and convey to the imperial exchequer the revenues of their respective departments. Of these viceroys, or bashaws, there are two orders, invested with different degrees of rank and authority. The first order are called bashaws with three tails, because three horse tails wave on their military standards; the second are named bashaws with two tails, for they are not allowed to adorn their standards with more than two such streamers. The authority of the bashaw with three tails is, in their respective governments, nearly as unlimited and despotic, as that of the monarch whom they represent. The military and executive power are united in their persons; and the lives and properties of all within their department are almost entirely at their disposal. They maintain a military establishment suitable to the extent, revenues, or the situation of their provinces; and when summoned by the sovereign, or when the frontier is menaced, they take the field at the head of their respective armies. In the administration of civil justice, however, the bashaws are not allowed to interfere. Every case of civil litigation is decided by the CADIS or judges, who, by a wise regulation, are made entirely independent of the viceroys. The bashaws with two tails have a less extensive department, and more limited power. They cannot inflict death without the sentence of law; and though they have the command of the armed force within their district, they are obliged in the field to range their troops under the standard of a bashaw with three tails, and to submit to his commands. In extensive governments the bashaws have likewise a number of delegates, who command, in their different spheres, with as despotic sway as the bashaw or the sultan themselves. Nothing can be conceived more galling and oppressive than this systematic gradation of despotism. The sword of the monarch is thus transferred into the hands of the meanest underling; and is always wielded with more dreadful effect, as it is more circumscribed in its range.

The abuses which prevail in all the bashawlics are dreadful beyond expression. As the great end of these governments is to convey the riches of the empire into the coffers of the grand seignior, it becomes of course the first obligation of a bashaw to levy and transmit the tribute imposed on his particular district. The means of doing this are left entirely to his own discretion; nor is it possible for him to be very delicate in the exercise of his authority. Obliged to purchase his appointment from the vizir, or some other person of influence, by bidding higher than all his competitors, he is of course eager to indemnify himself by his exactions. Besides, he finds it necessary still to advance considerable sums to the court, in order to obtain promotion, or even security, and therefore he has recourse to every expedient for raising money; and as he is uncertain how long he may retain his office, the readiest expedients are always preferred. The mode generally adopted is, to farm out the revenues of the bashawlic to some of the principal inhabitants at an exorbitant rent: these again subdivide them into smaller lots at an increased sum; and thus the system, becoming more oppressive as it descends, reaches even to the meanest hamlets. By this system a considerable proportion of the population are interested in increasing the public burdens; and as they are supported in their extortions by state-authority, the wretched inhabitants must submit to them without murmuring. The inevitable and immediate tendency of these extortions is to ruin and impoverish the country, by repressing the spirit of industry and improvement.

The extensive power of the bashaws naturally makes them ambitious to render it permanent; while the jealous policy of the sultan induces him to remove them frequently, that they may not have time to form such connections as may enable them to assert their independence. This precarious tenure by which the bashawlics are held, is productive of many evils. If the viceroy be of a bold and aspiring temper, his province is harassed by wars occasioned by his rebellion. At all events, they regard their governments as mere transient possessions, and are therefore eager to extort from them every temporary advantage, regardless of the sufferings of the people, who look forward, with a kind of desponding anxiety, to a change, which may only perhaps increase their oppression. Besides, in the frequent journies of the bashaws, the intermediate towns are subjected to great expense, and the fields and villages are ravaged by disorderly troops. Hence every part of the Ottoman empire, at any distance from the capital, presents a scene of the most complete desolation;—large tracts of country lying uncultivated, hamlets and villages uninhabited and in ruins.

Though the name bashaw is properly applied to a governor of a province, it is sometimes given, as a title of respect, to people of distinction, although they hold no such office. It is in that case placed after the proper name, and is equivalent to the French *monseigneur*, or to *your excellence*, *your honour*, &c. in English. For some interesting information relative to the bashaws, see Volney's *Voyage en Syrie et en Egypte*, tom. i. chap. x. vol. ii. chap. xxxiii. Olivier's *Voyage Dans l'Empire Othoman*, &c. chap. xvii.

Russel's *Aleppo*, vol. i. book ii. chap. vii. See also Guer's *Mœurs et Usages des Turcs*, tom. ii. lib. x. Savary's *Lettres sur Egypte*, tom. ii. let. 15. (μ)

BASHEE, or BASHI ISLANDS, a group of six or seven islands in the Chinese sea, situated between the island of Formosa and the Philippine Isles. The five principal islands are Grafton, Monmouth, Orange, Bashee, and the isle of Goats. The islands of Monmouth and Grafton are well peopled, but the island of Bashee, which is about two leagues in diameter, contains only one village. The mountains are very stony, but the valleys are very fertile, and are watered with numerous rivulets. The women take the charge of the plantations, while the men employ themselves chiefly in fishing. The principal productions of these islands are, bananas, plantains, pineapples, pumpkins, sugar canes, and cotton. Potatoes and yams, which grow in considerable quantities, serve the inhabitants for bread. The only articles imported into the Bashee islands are, iron and buffalo hides, which it is probable they obtain from Luzon, the principal island of the Philippines. East Long. 122°, North Lat. 23½°. (w)

BASHKIRS, a people of the Russian empire, scattered along the banks of the Volga and Ural. Their country forms a part of the ancient Bolgaria; and they seem to be descended partly from the Bolgares, and partly from the Nogay Tartars. Without any fixed abodes, they wandered formerly along the southern regions of Siberia, till the oppression of the Siberian khans obliged them to confine themselves within their present territories, and to court the protection of the khans of Kazania. When that government was subverted by Czar Ivan II., they voluntarily assumed the Russian yoke; though their subsequent revolts proved that their submission proceeded entirely from necessity. They now belong to the governments of Ufa and Perme; and consisted about forty years ago of 2700 families. They are divided into 34 *wolosts*, or tribes, each of which elects for itself one, and sometimes two, ancients or starschinis. In their manners they differ but little from the other Tartars. Fond of the pastoral life, their principal wealth consists in their flocks, and in herds of cattle, horses, and camels. They pay particular attention to the management of bees, in which they are very successful. Their hives, which, in general, are merely cavities in trees, are defended by many ingenious contrivances from the attacks of the bears. A very small proportion of their lands is under tillage, and oats and barley are the only kinds of grain which they rear. These, with the milk and flesh of their cattle, are the chief articles of their subsistence.

The Bashkirs still retain a strong antipathy against the Russians, insomuch that they consider it a kind of national duty, when they are employed by them as guides, to conduct them through marshes, and other places the most impracticable that they can find. The Russians, in their turn, are extremely jealous of the Bashkirs, and will not permit them to dwell on the mountains, that they may be able to keep a watchful eye over their conduct.

The troops of this nation are all horsemen, and are remarkably well mounted. They are armed with a bow, a lance, a helmet, and a coat of mail; and are besides provided by the Russians with sabres, muskets, and pistols. In drawing the bow they display uncommon skill, and manage their horses with great dexterity. In times of war they are obliged to furnish the Russian army with 3000 cavalry, which are divided into 30 troops, each consisting of 100 men. They are an indolent, slovenly, and simple people; but are hospitable, lively, and brave. See Chantreaux' *Travels*, Tooke's *View of the Russian Empire*, *Voyage de* Pallas, *Voyage de* Gmelin, &c. (μ)

BASIL, SAINT, surnamed the Great, was born in Cæsarea, in the year 326, and became bishop of that city. Having studied at Constantinople, he went to Athens to perfect himself in that school of science; and his studies being completed, he returned to his native country in 355, and taught rhetoric. While he resided at Athens, he became acquainted with Julian, afterwards surnamed the Apostate, who was also engaged in the study of eloquence in that celebrated city. With him Basil read not only the prophane authors, but also the books of the Holy Scriptures: Julian carefully concealed from him his real sentiments of the sacred writings. But when raised to the imperial throne, he threw off the mask, and filled his court with heathen philosophers and magicians from all parts of the world, Basil manfully rejected his repeated solicitations to reside at his court, though accompanied with the warmest professions of friendship. He afterwards retired to the monasteries in Syria, Egypt, and Libya, where he became so fond of the monastic life, that he embraced it on his return to Pontus and Cappadocia. Having received the order of priesthood from Eusebius bishop of Cæsarea, he retired into religious solitude; but, in that state, he continued only about three years; for upon the death of that bishop in 370, he reluctantly allowed himself to be appointed his successor. No sooner was he seated in the episcopal chair, than the emperor Valens began to persecute him, and even threatened to banish him from Cæsarea, because he refused to embrace the tenets of the Arians. The emperor sent to him a prefect, who was commanded, either by entreaty or menace, to obtain his compliance. The pious Basil peremptorily refused. The prefect having reminded him of the danger to which he was exposed, of having his *land*, his *liberty*, and even his *life* sacrificed by the disappointed emperor, he made the following noble reply: "He who has nothing, dreads not *confiscation*. Every place being alike indifferent to me, how can any *exile* be a punishment? If you *imprison* me, I shall enjoy more pleasure than at the court of Valens. And with respect to *death*, it will be to me a blessing, because it will unite me to the Almighty." The prefect was astonished, and remarked that none had ever presumed to speak to him in that manner. "Probably," replied Basil, "you never before saw a *bishop!*" Finding it impossible to bend him from his resolution, the emperor ceased to molest him; and Basil then began to use all that influence, which his high character and office had so justly acquired, in endeavouring to compose the differences which at that time subsisted betwixt the eastern and western churches: but unhappily his well meant efforts proved ineffectual, and that contest was not terminated

er his death. He also took a share in the va-
controversies, which arose in that period of the
h, and died in the year 379. "In point of
, controversial skill, and a rich and flowing
nce," says Mosheim, "he was surpassed by
ew in that century." There have been several
s of his works in Greek and Latin. The last
st is that published at Paris in 3 vols. folio, in
by Julien Garnier, a learned benedictine. See
im, vol. i. p. 358. *Ant. Univ. Hist.* vol. xvi.
Biog. Dict. vol. ii. p. 75. (A. F.)

SILAN, or BASSEILAN, one of the Philippine
, situated about three leagues from the south-
xtremity of Mindanao. This rich and fertile
which is called the Garden, produces plan-
ees, sugar canes, and rice in great abundance;
eat quantities of fish of every kind are found
coasts. Fine tortoises are caught for the sake
ir shells, and two kinds of jet are found in
plenty. There are numbers of wild boars and
n the forests. Pearls are fished on the coast,
nsiderable quantities of ambergris are thrown
ore. Basilan is the only one of the Philippine
here elephants are found. East Long. 121°
orth Lat. 6° 25′. (*w*)

SILAR, in Anatomy, a term derived from
nd generally employed to distinguish those ves-
hich supply the base of the brain, as the *basilar*
. It has, of late, been extended by Dr Barclay,
icate the aspect or position of parts of the head
espect to the *base of the skull*. See ANATOMY,
p. 745. (*f*)

SILIC VEIN, in Anatomy, that large superfi-
in of the arm, which passes next the internal or
condyle of the *humerus*, and which gives off a
branch across the arm called the *median basi-*
(*f*)

SILICA, a particular kind of public edifice.
ord, according to its strict etymology, (from
υς and οικος), means a royal house. The basi-
ems originally to have been a hall in which
was administered; and as this was, in the pri-
ages, the exclusive prerogative of the sove-
it might then, with great propriety, be called
use of the king. All the ancient basilicas have
o completely destroyed, that scarcely any thing
wn with certainty of their form and internal ar-
nent. The basilicas at Rome were spacious
uilt around the forum, where the different or-
f judges administered justice, and where public
s of every kind was transacted. The first of
halls was built under the direction of M. Por-
ato, the censor, in the year of the city 566.
ius, the only ancient architect of whose wri-
e have any remains, gives the following direc-
or the construction of these buildings: "That
nts who resort thither on business may not be
noded by the weather, the basilica should be
djoining to the forum on the warmest side.
adth should not be less than one-third, nor ex-
ne-half of the length, unless the nature of its
on render it necessary to depart from these
f symmetry. The height of the columns must
al to the breadth of the portico, which occu-
third part of the space in the centre; the upper columns should be one-fourth less than the lower. The pluteum, between the upper columns, should also be made one-fourth less than these columns, that those who walk on the floor above may not be seen by the merchants below." From this description it appears that the basilica consisted of a great nave in the middle, surrounded with one range of porticoes, and a single row of columns.

Basilicata,
Basilicus.

It has been erroneously supposed, that the ancient basilicas were converted, on the overthrow of paganism, into Christian churches. Buildings of a similar form, and of the same name, were indeed occupied by the early Christians for the purposes of their worship; but the details of their architecture forbid us to refer these buildings to a remoter date than the reign of Constantine, when Christianity first became the established religion of the empire. Constantine reared many of these edifices, as monuments of the triumph of his religion. One built on the scite of his own palace on the Cœlian Mount, is ascertained to be the most ancient of these Christian basilicas. He next demolished the circus of Nero, and the temples of Apollo and Mars, to raise on their scite the magnificent basilica of St Peter of the Vatican. It consisted of five aisles from east to west, terminating at the end in another aisle from north to south, in the centre of which was a large tribunal, giving the whole the form of a cross. The aisles were enclosed by numerous columns of the richest marble; superb paintings covered the walls; mosaics of exquisite beauty adorned the tribunal; and the whole temple was illuminated by an incredible number of lamps. This magnificent edifice, respected even by the barbarous conquerors of Rome, stood uninjured for twelve centuries; till yielding at length to the corrosive influence of time, it was pulled down by Pope Julius II., and the famous church of St Peter, the grandest specimen of the ecclesiastical basilica, and the boast of modern Rome, rose out of its ruins. As the simple grandeur of ancient architecture was lost in the clumsy magnitude of the Gothic structures, the airy elegance of these ecclesiastical basilicas, consisting of quadrilateral halls, with a single roof and flat ceiling, supported on ranges of light pillars, degenerated into the awkward cross-shape, the vaulted roof, and the massy columns of the modern cathedral. See *Encyclopedie Methodique, Arch. de* A. Palladio, and Vitruvius. (*μ*)

BASILICATA, a province of the kingdom of Naples, so called from the Emperor Basilicus II. and situated between the two great arms of the Appennines which embrace the gulf of Taranto. It is about 66 miles long, and 50 broad, and contains 1,284,038 English acres. It is traversed by several branches of the Appennines, and is watered by the rivers Basiento, Brandano, Salandrella, Acri, Sina, and Coscile. It is bounded on the east by the gulf of Taranto, and produces corn, wine, oil, cotton, saffron, honey, and wax. Venosa and Acerenza are the principal places of the province. Population 325,682. (*w*)

BASILICUS, or BASILISCUS, in Zoology, a subdivision of the *Lacerta*, or lizard tribe, formed into a separate genus by Laurenti and Daudin, and comprehending those lizards which have a tail compress-at its extremity, and a crest proceeding along the back from the tail to the neck. See Herpetology. (*f*)

BASILIDES. See Church History.

BASILISK, a creature famous among the earlier writers of natural history for its dangerous properties. It is described by Galen, Pliny, Lucan, and several other naturalists and poets among the ancients, and by Lobo, Prosper Alpini, and Aldrovandi, among the moderns. From their accounts we gather, that the basilisk was a kind of serpent, or reptile, of a yellowish colour, having on its head several little prominences of a speckled appearance, and furnished with eight feet, and two large scales that served it for wings; that its breath was so pestilential as to taint the air around it, and prevent any other animal from breathing in the same atmosphere; and that even its look was so piercing and so baneful, as to cause instant death to the person on whom it fixed its terrible glance; that it inhabited the desarts of Africa, and the lakes that form the sources of the Nile, where, like the phœnix, it reigned alone in gloomy solitude. From this circumstance, some have derived its name from the Greek βασιλιζομαι, to reign; while others choose to draw the etymology from the *crowned* appearance of its head. Its origin was not less extraordinary and portentous than its figure or its *properties*. It was generated from a cock's egg, hatched by a serpent.

Such is the substance of the accounts which the credulity or invention of the above authors have handed down to posterity. We forbear to abuse the patience of our readers, with relating the many idle and puerile stories which are told of this wonderful reptile; but we may remark, that a similar instance of credulity still prevails in this country, respecting what is called the *cockatrice*. This creature, worthy to rival the basilisk in its nature and origin, is generated from the *egg of an old cock*, hatched, not by a serpent, but a *toad*; and so dreadful is justly deemed this unnatural progeny, that the building, in which such a phenomenon has taken place, must be burnt to the ground, as the only means of averting the danger impending on the master or his family. (*f*)

BASILUZZO, one of the Lipari islands on the north of Sicily, about two miles in circuit, and considerably elevated above the level of the sea. A small quantity of corn and pulse which grow on its level summit, are the only nourishment for the inhabitants of two small cottages. Spallanzani is of opinion, that this and the other Lipari islands is of volcanic origin; but Professor Jameson seems to think that they are composed of rocks of the newest flœtz trap, or second porphyry formation. See Spallanzani, *Voyages dans les deux Siciles*, vol. ii. p. 140; and Alicuda. (*x*)

BASINGSTOKE, a market town in Hampshire, pleasantly situated in an open and fertile country. The ruins of the chapel of the Holy Ghost, situated on an eminence on the north side of the town, and the newly erected market-house and town-hall, are the main objects deserving of notice. The principal manufactures of the place are shalloons and druggets; and the communication with London, by means of the Basingstoke canal to the river Wye, has increased its market for corn and malt. Number of houses 512. Population 2589, of whom 365 v as engaged in trade. See Warner's C *the History of Hampshire*. (*w*)

BASKET Salt. See Salt.

BASLE, Basil, or Bale, one of t Swisserland, situated on the banks of th bounded on the north by Alsace and Bri Frickthal, or the territory of the fore the canton of Soleure, on the east; on the canton of Soleure; and on the w shopric of Basle. It extends about 20 m from north to south, and about 18 i breadth from east to west.

The climate of this canton is temp lubrious, and the country is delightf mountainous, it has many vallies and pl ly fertile and well cultivated, while t pect of the mountains themselves rende at once beautiful and grand. Many o hills are covered with vineyards, or cl summits with luxuriant herbage; be its mountains, forming part of the c tower in Alpine majesty, and seem to superable barrier around the country. too, which flows through this canton, g ens the sublimity of the scenery. In r course does it fill an ampler channel, or r stream with such an impetuous rapidity in Europe are blessed with a greater comforts, and even of delicacies, than t Basle. Plentiful crops of grain, fruits are the productions of its genial soil; it bour great variety of game; and the which enriches its fields, teems with diff of excellent fish.

The bounty of nature is here seco industry of the inhabitants. Agricultu tures, and their attendant arts, fostered ing government, are pursued in this cou ardour naturally inspired by the certai return. The principal branches of m are ribbons, of which, so far back as th there were no fewer than twenty factori pital, which distribute annually upwards florins, as wages to the workmen; si figured cottons; bonnets; gloves; pap bleaching, and dyeing. These manufac ported by agriculture, in their turn contr tially to its improvement, by increasing b sumption, and the means of enriching the

The population of the canton is estimate persons, and its extent is about 160 squa

Previous to its subjugation by the F government of Basle was aristodemocra supreme power was vested in two asse led the *Great and Little Council*. The cil was composed of 216 members take 18 tribes of the large and small town council consisted of 60 members, 4 be from each of the 15 tribes of the great these we must add two burgomasters, and tribunes, who were the four chiefs of The supreme council, composed of these decided on all the great political and ec terests of the state; exercised legislative and now threatened their capital, were obliged to submit without a struggle. On the 24th of January 1798, the tree of liberty was planted on the walls of the city; and on the 5th of February, the magistrates resigned their authority, and sixty delegates, appointed by the people, were invested with temporary power, till the new constitution should be properly organized. With the addition of the lower part of the Frickthal to Seckingen, Basle forms one of the departments into which Swisserland was divided by the constitution of the 29th of May 1801, with the right of sending three representatives to the diet. See *Dictionaire de la Suisse*, and Coxe's *Travels in Switzerland*, vol. i. p. 66. of the introduction, and *Letters* 15 and 16. (μ)

BASLE, or BASIL, the capital of the above canton, is beautifully situated on the banks of the Rhine, about 60 miles south of Strasburg, and 120 northeast of Geneva. The river, which is here in its greatest beauty, broad, deep, and rapid, divides the city into two parts, called the large and small town; which are joined by a noble bridge of 14 arches, and about 600 feet in length. Each of these divisions is surrounded with walls and a ditch. Without the compass of the large town there are fine extensive suburbs, which form so many distinct quarters, and are all enclosed by a regular rampart. Basle is the largest and was once the most populous town in Swisserland. It is capable of containing upwards of 100,000 inhabitants, though its present population does not exceed 14,000. To account for this decrease, we may observe, that the natives of Basle, like the rest of the Swiss, have always been fond of emigration, and that here, as in all great cities, the number of births is inferior to that of burials. It is evident, therefore, that if the loss of numbers, thus produced, be not supplied by a regular accession of new inhabitants, the population must be rapidly diminished. Now the Basilians are so proud and so jealous of their rights and privileges as burghers, that they very seldom deign to confer them on strangers, who, thus deprived of the power of engaging in commerce, or practising any trade in the capital, have no inducement to resort thither to supply the vacancies made in the population, by the emigration or death of the native citizens. A more enlightened and liberal policy might have rendered this city extremely populous and flourishing; for it is most favourably situated for commerce, and enjoys besides several internal advantages peculiar to itself. No place can boast of a greater number of fountains, some of which have even their source within the town; besides the Birs, a stream which falls into the Rhine, a little above the city, supplies it by means of a canal with water, particularly well adapted to various purposes of trade.

This city is adorned with many noble streets and spacious squares. Its houses are in general built of stone, in a neat and elegant taste. Except some splendid mansions, in which a few rich manufacturers display their wealth, there are no buildings in Basle whose magnificence can offend the republican spirit of its inhabitants; but in every house there appears that air of neatness and of comfort, which is the truest enjoyment, and the natural privilege of easy and independent circumstances. The cathedral is a superb Gothic structure, but is much disfigured by the rose-coloured paint with which it is bedaubed. It contains the monuments of many illustrious persons, and is particularly consecrated by that of the great Erasmus, who made this town his principal residence, and published here many of his valuable works. The terrace of this cathedral, which serves as a public promenade, commands a very rich and extensive view; but on another side there is a covered gallery, full of tombs and monuments, the unseemly appearance of which is as indecorous for the dead, as its noisome exhalations are pernicious to the living. Besides the cathedral, this town contains six parochial churches, and seven convents, which were secularised by the Reformation.

The public library is more remarkable for the rare and valuable editions of the books which it contains, than for the number of its volumes: it is enriched with numerous manuscripts, the most curious of which are the letters of the first reformers, and of other learned men in the 15th, 16th, and 17th centuries; and an account of the proceedings at the council of Basle. Here, too, are preserved, with great veneration, the hanger and seal of Erasmus, some of his letters, and his last testament, in his own handwriting. There is a suite of apartments connected with the library, which contain a cabinet of petrifactions, some ancient medals and gems, a few antiquities found at Augst, a large collection of prints, and some admirable drawings and paintings, consisting chiefly of originals by Holbein, who was a native of Basle, and the favourite painter of Henry VIII. to whom he was introduced by Erasmus. In these paintings, which are in high preservation, the progress of Holbein may be traced, from the earliest efforts of his pencil till he attained that perfection in the art for which he has been so generally admired. Some pictures are preserved which he painted before he had reached his 16th year; and one, particularly curious, which he drew upon a sign for a writing-master. The most esteemed of his productions is an altar-piece, in eight compartments, which represents the passion of our Saviour: a performance which, for brilliancy of colouring, cannot be exceeded. The Dance of Death on the walls [illegible] an ancient convent of Dominicans, pointed out [illegible] strangers as a production of Holbein's, has been proved, from incontestible authority, to have been painted before he was born.

The hall still remains in which were conducted the deliberations of the famous council of Basle, which, after sitting for many years, came to the resolution of deposing the pope; and published many edicts for the reformation of the church. A picture is still to be seen on the staircase of the zeal of the council-house, supposed to have been suggested by these pious fathers, in which the devil is represented as driving the pope and several church dignitaries before them into hell. Basle is the seat of an university, which once ranked among the most eminent seminaries of learning in Europe. It was founded in the 1460, by Pope Pius II. and its fame will be perpetuated in literary history by the illustrious names of Oecolampadius, Amerbach, the three Bauhins, Grynæus, Buxtorf, Wetstein, Iselin, the

Bass Straits, Bassano.

from Van Dieman's Land. We do not know that the precise extent to be included in this channel is definitively fixed: the navigators of the French expedition who explored it in 1801, say it is about 50 leagues in length from east to west, and the same in breadth from north to south. All the earlier navigators supposed New Holland a vast continent including Van Dieman's Land, the southernmost point of which was considered the extremity of New Holland; but circumstances induced several of those who more lately traversed the Australasian seas, to conjecture that there might be some strait or channel dividing them. No one, however, could penetrate further than into what they called deep bays and inlets. At length, ten years after the establishment of the English colony of Botany Bay, Mr Bass, the surgeon of a man of war, disliking the idleness which particular occurrences exposed him to, made an excursion in an open boat, which fortified him in the belief of an open passage, separating New Holland and Van Dieman's Land into two great islands. A subsequent voyage proved the fact, and the strait received his name.

Bass Straits have been surveyed by Captain Flinders along with Mr Bass, by the officers of the French expedition, and by Captain Grant of the British Navy. The discovery of them has been judged of material consequence in shortening the voyage from Europe to India. Many vessels have now passed through them, but from the rocks and islands with which they abound, experienced seamen affirm that it is a voyage of danger.

Commercial enterprise has given birth to active operations in fisheries established in different parts of the straits. Parties are carried thither in small colonial vessels from Port Jackson, and established in gangs of ten or twelve, to collect seal skins and the oil of the sea elephant, for animals of the *Phocæ* tribe are extremely plentiful in this channel. These speculations were for some time confined to the settlers exclusively; but the Americans began to avail themselves of the same advantages, and the number of adventurers increased so rapidly, that in a few years after its commencement the fishery was rather on the decline. The British government, however, resolving to encourage the enterprise of its own subjects, attempted to establish a colony at Port Philip, on the north shore of the straits. The different gangs engaged in the fishery previously shifted their abode from place to place as the objects of pursuit became scarce, and the collections they made were sent to Port Jackson. Port Philip, it was thought, would be a secure place of rendezvous, where the produce of the fishery might be deposited until ready for exportation; and it would besides prevent any rival nation from establishing a settlement on the coast, and proving troublesome neighbours to Port Jackson. Nevertheless this attempt proved abortive, and the settlement was removed. See Collins' *Account of Botany Bay*. Flinder's *Voyage*. Tuckey's *Voyage*. Grant's *Voyage in the Lady Nelson*. Peron *Voyage aux Terres Australes*. Also AUSTRALASIA, and PRESERVATION ISLAND. (*c*)

BASSANO, a town of Italy in the Trevisano, situated on the river Brenta. It is nearly 5 miles in circumference, and contains 30 churches, 2 mon teries, and 3 hospitals. One of its gates was b by Palladio. A large printing establishment, some silk and woollen manufactures, are the only jects deserving of notice. Population 11,300. E Long. 11° 43′, North Lat. 45° 46′. (*j*)

BASSE DES FREGATES FRANCOISE, a danger rock in the North Pacific Ocean, about 100 y long, and 50 high, situated on the north-west ex mity of a reef of rocks, stretching about 12 mile the south-east. West Long. 165° 50′, North 23° 45′. A more full account of this rock, wit surrounding shoals, will be found in La Peyrou *Voyages*. (*j*)

BASSEEN, a fortified town of Hindostan, on western coast of the peninsula, situated about miles north of Bombay, in an island separated f the continent by a small rivulet. In the year 1 it was a considerable city, with two colleges, churches, and four convents. East Long. 72° North Lat. 19° 20′. (*j*)

BASSET, the name of a game at cards. De Moivre's *Doctrine of Chances*, p. 69.

BASSIA, a genus of plants of the class Dode dria, and order Monogynia. See BOTANY. (w

BASSO RELIEVO, that branch of sculpture w represents figures in such a manner that no par them is detached from the back ground; dis guished from alto relievo, which has the gro parts of the figure attached to the back grou while the minuter parts rise completely free from surface. The term is of modern date, but the art self is of nearly as remote antiquity as the hierog phic mode of writing, from which indeed it der its origin. In Greece, where sculpture, in all branches, reached the highest perfection, basso reli was called αναγλυπτη, *carved work*; and the alto lievo was distinguished by the name of περι *rounded*; appellations which contain in themsel an accurate definition of these different species of art. For a more detailed description of basso lievo, see SCULPTURE. (*μ*)

BASSORA, BUSSORA, or BASRAH, a city of A bian Irak, in the Pachalik of Bagdad, is situated u an arm of the Schatt el Arab, or river of the Ar about mid-way between the gulf of Persia and junction of the Euphrates and Tigris. It was b by the Caliph Omar, in the 16th year of the Heg to command the trade between India and the eas empire, and to restore the communication by the sian gulf, which had been cut off by the conquest his predecessor. Planted in the midst of a deligh country, and surrounded by fertile pastures, and uriant orchards, a little colony of 800 Moslems ra ly increased in numbers and in opulence. Under first caliphs its jurisdiction extended over the so ern provinces of Persia; and, from the influenc its situation as a port of trade, Bassora soon rose of the first commercial cities of Asia. Its harbo which afforded a commodious station for ships of greatest burden, was filled with vessels from ev nation. The riches of Europe and India were ac mulated at Bassora, and its merchants were consid ed as the most opulent and industrious in the E Its importance, however, as an emporium of tr as of late rapidly declined. In comparison with its ormer prosperity, commerce has lost its vigour and ctivity; industry and the arts are almost extinguish- d; and the town itself is fast hastening into insigni- cance. Houses wretchedly built, and streets co- ered with filth, surrounded with a sorry mud wall, resent to us the humiliating picture of the once flou- shing city of Bassora. The bazars, or market lace, however, are extensive and well supplied, par- cularly with every description of fruit, such as ap- les, grapes, peaches, nectarines, pomegranates, &c. nd the cabbages and other vegetables are equal to ny in Europe. Such is the honesty of the natives, r rather such is the rigour with which theft is pu- ished by the Turkish government, that these articles e exposed all night in the open market, without any ther protection than a mat thrown over them to creen them from the weather. The pale complec- ons, and the weak and sickly constitutions of its in- abitants, betray the unhealthiness of the climate, which is rendered almost uninhabitable by the annual verflowing of the river, which forms, in the vicinity f the city, marshes and ponds, where the stagnant water putrifies during summer, and poisons the at- nosphere with its noxious exhalations. Mounds of rth are raised by the natives to prevent these inun- tions, but they are frequently broken down by the lence of the water, which, spreading far into the in, deposits there the seeds of disease and of th. This circumstance, joined to the terror which Wahabees have inspired by their frequent incur- s into the country, and the numerous pirates ich infest the Persian gulf, has tended consider- y to depopulate Bassora, and to bring it to its sent degradation. What remains of the com- rce of this city is chiefly carried on by the Eng- and Arabs; and, notwithstanding these unto- d circumstances, it is still a general staple for ous kinds of merchandise. Coffee from Mocha; rls from the islands of Bahrein; plain and em- idered cloths, silk stuffs, spiceries, and drugs, n India; dried fruits, tobacco, carpets, and per- es, from Persia,—are here exchanged for gold, er, copper, dates, and various European commo- es, such as small ironware, satins, woollen cloths, — which come through Syria by way of Bagdad. rses, also, form here a considerable article of nmerce. They are said to be the most beautiful strongest in the world, and capable of perform- most incredible journies. They are exported great numbers by the English consul, who em- ys some ships for this purpose. The merchan- e annually brought to Bassora was valued by the bé Raynal at £525,000; of which the Eng- furnished £175,000, the Dutch £87,000, and Moors, Banians, Armenians, and Arabs, the re- ainder. But the revenues of this city, which were rmerly very considerable, are now scarcely sufficient r its defence.

Bassora continued under the authority of the Sa- cens till about the middle of the 17th century, hen it was taken by the Turks. It then yielded the Persians, after a siege of ten months, but was acuated by them upon the death of Kerim Khan. rom that time it has constituted a part of the Ottoman empire, and is governed by a lieutenant, who exercises his authority in the name of the pacha of Bagdad. Twelve armed galiots are constantly kept here for the protection of the merchant vessels which enter the Persian gulf; but they seldom venture out to sea, as they are too old and crazy to encounter the least bad weather; and the Arab tribes of *Zibes* and *Muntefiks* receive an annual subsidy of 100,000 piastres for the defence of the city. The Wahabees have frequently attempted to get possession of Bassora, but have as often been repulsed. It cannot, however, be expected that it will long withstand the fury of these sectaries, who have already subdued, or converted, most of the neighbouring tribes. The population of Bassora is composed of a mixture of Christians, Jews, Persians, Indians, and Sabeans, but chiefly of Arabs, and amounts to about 40,000 souls. Many of the Persians in Bassora are persons of good family, who have been driven from their country by the various revolutions with which it has been agitated. E. Long. 46°, N. Lat. 30° 32′. See *Description du Pachalik de Bagdad*, p. 31, Paris, 1809. Waring's *Tour to Sheeraz*. Peuchet *Dict. de la Geog. Commerç*. tom. ii. Mirza Abu Taleb Khan's *Travels in Asia, Africa, and Europe*, vol. ii. c. xxxv. p. 364. (*p*)

BASSOVIA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

BASTARDY. See ILLEGITIMACY.

BASTILE. This name was given to the chief state prison of France, prior to the revolution in 1792. It is derived from *bastir*, to build, originally spelt *batir*, and is of the same root with the term *bastion*. There were many places of strength in different parts of France which were used as state prisons, besides the edifice called, by way of distinction, The Bastile. Thus, according to Linguet, (*Mem. sur la Bastille*) there were "Pierre en Cise," at Lyons, the Isles of St Margaret in Provence, Le Mont St Michael in Normandy, the Chateau du Taureau in Brittany, the Castle of Ham in Picardy, that of Saumur in Anjou, and others, amounting, in all, to nearly a twentieth part of the fortified places in France. Each of these had its governor, its etat major, its inferior officers, and its *prisoners*.

The Bastile, properly so called, was situated at the gates of Paris, near the road to St Anthony. It was built in the reign of Charles V., A. D. 1370, by Hugh d'Aubriot, mayor of the city. According to the original plan, it consisted of nothing more than two round towers on opposite sides of the street, joined together by a cross wall of great strength, having in the middle an opening for the gate. This opening was afterwards shut up, when the course of the road leading into the city was changed. Charles VI. built several other towers, forming, by means of intervening walls, two complete courts, which may be regarded as the body of the edifice: the whole was then inclosed within a ditch, and secured by a counterscarp, or facing in masonry, nearly 36 feet from the bottom. In the courts alluded to, the walls were of an extraordinary thickness, and on the inside they extended to the height of 80 feet above the level of the pavement. The other parts of the building were added occasionally under different monarchs. It was in the towers that the prisoners were usually confined. The structure of all these was nearly uniform; so that, from a description of one, the reader may be able to form an idea of the rest. Each tower consisted of four stories, besides the dungeon. This last was arched, paved, and lined with stone; the top, or ceiling, being almost on a level with the court, and the floor raised considerably above the bottom of the ditch. In some of the dungeons there was a slit in the wall for the admission of light, but in others there was none. There was no stove or fire-place in any of them. It is said, that these abodes of darkness and misery were intended for the punishment of such as endeavoured to escape from their confinement. It may have been so; but, after making every allowance for exaggeration, it is not to be denied, that the unhappy victims of tyranny, who, for whatever reason, were doomed to occupy them, were not unfrequently the subjects of the most studied and persevering cruelty. In these dungeons the princes of Armagnac were immured by the orders of Louis XI. One of them, sinking under the weight of wretchedness and despair, became disordered in his mind during his confinement; and the other, upon a change in the government, recovered his liberty, and afterwards published an account of his sufferings. Above the dungeons rose successively four apartments, each occupying a single story. The uppermost, named *la calotte*, was somewhat smaller than the others. The intermediate ones were irregular polygons, nearly 18 feet across the floor, and of the same height. From the dungeon ran a winding staircase towards the apartments above. The walls were 12 feet thick at the highest part of the tower, and increased in diameter as you approached the bottom. On the parapet some pieces of ordnance were usually mounted.

With regard to the individual apartments, the same massy strength and gloomy grandeur which characterised the rest of the building appeared in them also. The doors were of oak, and double, each three inches in thickness. None of the rooms had more than one window, which, in every instance, was secured by an iron grate of prodigious strength on the outside, and by another of similar dimensions fastened in the centre of the wall. The frame, containing the glass, moved upon hinges, and opened inwards, after the manner of a door. In some instances, the embrazure, or under part of the window-case, reached the level of the floor, but in others it was necessary to ascend to it by a flight of steps. In the lower stories the windows were built up nearly the half of their length with stone, lest the prisoner should be discovered by any one from without. The chimney was likewise secured by iron grates, crossing the vent at proper distances. The floors were laid with stone, or tiles. Most of the apartments had the same kind of furniture, both as to the number of articles and their quality. It usually consisted of a bed, a table, and a chair, a bason and ewer, a large earthen pitcher for holding water, a candlestick, generally of brass, a night-stool, a pot'de chambre, a broom, and a tinder-box, with a supply of matches. Persons of distinction, however, were often better accommodated, having rooms according to their dignity, and being allowed, in particular circumstances, the convenience of their own furniture. Each apartment was numbered; and as every tower had its name, it was not at any time necessary to say who the prisoners were when orders were given with respect to them, or when they happened to be the subjects of conversation; but only to mention them in the language of the place, as No. 1. *Du Tresor*; No. 2. *De la Contè*; No. 3. *Du Coin*, &c.

The officers who had the direction and charge of the Bastile were the following: The governor; the lieutenant du roi; a major with two adjutants; a surgeon and his assistant; a chaplain; four turnkeys; together with a company of invalids under their usual officers forming the garrison. All these had their apartments within the walls of the castle. Besides these, there were the physician; two priests assistants of the chaplain, enjoying each a salary of 400 livres; a keeper of the registers; a clerk; a superintendant of the works, and an engineer. The attendance of these was occasional, and they usually lived in the city. To the governor was entrusted the whole internal management of the Bastile: he administered the oath of allegiance to the inferior officers: he received from the king a certain allowance for the support of each prisoner, according to his rank; and the cooks and other persons belonging to the kitchen were all engaged and paid in his name. The maintenance of a prince of the blood was estimated at fifty livres daily; that of a marechal de France at thirty-six; that of a lieutenant-general at twenty-four; that of a member of the French parliament at fifteen; that of a judge, priest, or person holding any situation of importance under the crown, at ten; and that of a respectable citizen at five. In each of these instances, however, the estimate is to be considered exclusively of the charges for fire and candles, as well as the expense of washing. It belonged to the major to examine the prisoners immediately after their arrival, or, according to the orders received, in presence of the *lieutenant du roi*. The officer last mentioned had also the charge of the keys, which were delivered to him every night as soon as the bridge was drawn up. Certain individuals of the staff made their rounds daily, and gave an account of what they had seen and heard at their visits, either to the governor in person, or in his absence to some one appointed by him. But the governor and all the officers mentioned above, were wholly passive; they did nothing without orders from the lieutenant of police, and he himself indeed acted only as deputy to the minister of Paris, in whose department the Bastile was situated. It was by that minister, or by one of the secretaries of state, that the *lettres de cachet* were countersigned; those awful intimations of despotism, by which thousands were deprived of their liberty and their reason, and not unfrequently of their lives. These letters were sometimes addressed to the individual, whom the caprice of the monarch or of his favourite had doomed to confinement, sometimes to the governor of the Bastile exclusively, but commonly to both. The following is an instance of a *lettre de cachet*, inscribed "A mon cousin le Prince de Monaco, brigadier en mon enfanterie," by Louis XV.

Mon Cousin,
tant peu satisfaìt de votre conduite, je vous
tte lettre, pour vous dire ; que mon intention
sitot qu'elle vous aura ete remise, vous ayez à
endre en mon chateau de la Bastile, pour y
jusqu' à nouvel ordre de moi. Sur ce je prie
u'il vous ait mon cousin, en sa sainte garde.
Versailles, le 25 June 1748.

Signè Louis.
Voyer d'Argenson."

ur Prince
Monaco.

n tyranny was at its height, the *lettres de*
were subscribed by the king and given to
ister, with spaces left for the names of those
ere so unhappy as to incur the displeasure of
And the minister, thus unwisely put in pos-
of absolute authority, became, in many in-
, the terror and the aversion of all who were
ntly eminent to attract his notice. In allusion
absolute authority, it was sarcastically said by
the wits of France, "you must hold the *pot*
mbre to the minister when he is in office, but
y pour its contents on his head when he goes

registers of the Bastile are three in number.
ook containing the names of the prisoners, the
f their arrival and dismission, the number of
rtment which each of them occupied, with
s on their circumstance and behaviour. 2. A
f inventories, or lists of the articles found upon
ng the prisoners, as they arrived: the name of
risoner was likewise set down in this book, op-
the catalogue of the articles belonging to him.
discharge-book: This contained the receipts
d by the prisoners after the period of confine-
ad elapsed, when their effects were restored to
It contained also the subscription of each pri-
by which he bound himself under the obliga-
f an oath, to maintain an inviolable secrecy
spect to all that he had seen or heard in the
.

manner of arresting those whose incarcera-
as decreed varied, according to circumstances,
ir treatment after their arrival had, in most
es, a great similarity: "La Bastile," says
et, "comme la mort, egalize tous ceux qu'elle
tit." A short examination before the lieute-
u roi being over, the prisoner was commanded
up his money, watch, and jewels; and the
was assigned, lest he should corrupt the turn-
r inferior servants of the place. He was next
d to part with his scissars and pen-knife; and
oo, the reason was given with unfeeling plain-
est he should either cut his own throat, or as-
te those whose business it was to visit and in-
im. At this ceremony, the officers who were
, utterly regardless of the terror and appre-
often appearing in every look and motion of
isoner, commonly indulged themselves in a
pleasantry as the different articles were pro-
It was then enquired what room was empty; and on receiving a proper answer, the wretched individual was conducted to his apartment. Here he sometimes remained for a long time, even for several months, before he was allowed to be shaved. This indulgence was never granted till the prisoner had been examined a second time, or till all the information which was wished for had been obtained:* and in no instance could it be granted without permission in writing from the minister of Paris, through the medium of his deputy the lieutenant of the police. The operation was performed twice a week by the surgeon of the house; always, however, in presence of a turnkey, who had strict orders to prevent the captive from touching the razors: The surgeon likewise pared the nails of the prisoner, under similar precautions. As the governor supplied the prisoners with clothes, furniture, and faggots, out of an allowance made to him by the king for that purpose, the provision of these articles was often exceedingly scanty. Hence the wretches intrusted to his care were subjected without remedy to all the severities and changes of the climate; to the intolerable cold of large apartments, with high ceilings, in winter, and to the heats of summer in rooms not capable of ventilation; a grievance rendered yet more distressing by the steams issuing from the water that putrified in the ditch. When upon a certain occasion a prisoner made application to the governor for more comfortable clothing, or leave to purchase it with his own money, the answer of that inhuman monster was, "Il faut ne se pas mettre dans le cas d'être à la Bastille, ou savoir souffrir quand on y est." At this reply the very *Porte-clefs* were obliged to turn aside their heads.

Bastile.

It has been doubted whether the accounts given by authors of the iron-cages and instruments of torture used in the Bastile were founded in fact. After some enquiry, it appears to us, that though these accounts have been exaggerated, the modes of punishment referred to, were unquestionably practised, not perhaps in the reign of Louis XVI., but certainly in those of former monarchs. The Count de Boulainviliers relates, that he saw at the Chateau Duplessis, an iron cage in which the Cardinal de la Balue, first minister to Louis XI. had been confined. Louis XII. while Duke of Orleans, experienced a similar fortune with the Cardinal. A wooden cage 9 feet long, 6 broad, and 8 high, was to be seen previous to the revolution at St Michael in Normandy. In this cage, the editor of a newspaper published at Leyden, who had written a satire on Louis XIV. was shut up, and died after a confinement of many years. It was placed in the centre of a room every way resembling the apartments of the Bastile; and from the great strength of the walls rendering an escape nearly impossible, it must have been designed not for security, but for punishment. Some of the bars were marked with landscapes and figures of different kinds, which the miserable captive had imprinted on it with his nails. La Porte, premier Valet de Chambre to Louis XIV. when enumerating the various means employed by the officers of the Bastile to force from him the secrets of the queen, with which they supposed he

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m the register of prisoners, it appears that a German, called Veillart, underwent no fewer than 89 examinations.

was entrusted, distinctly states, that an order was produced by the commissary acting under the lieutenant of the police, for putting him to torture in case of obstinacy, and that he was conducted to a room where the different instruments were shown him, and their application pointed out. Finally, there is good reason to believe, that in the reign of Louis XI. not a few perished in the dungeons of the Bastile, by means of poison secretly introduced into their food.

In later times, however, the torture of the mind appears to have been studied by the agents of despotism rather than that of the body. No sooner had a prisoner, for some reason or for none, entered the Bastile, than he passed at once into a state of utter exclusion from the rest of mankind. If his friends enquired after him, it was denied, even with oaths and imprecations, that he was in confinement. And the governor has been known to express his astonishment, that they should suppose him to be in the Bastile. The only persons who visited the prisoners were the turnkeys and officers of the house. On these occasions the most insidious questions were put to them, and their answers, carefully remembered, were afterwards written down. No one was allowed to approach them in whom they could confide, or from whom they could ask advice. And if, in particular circumstances, a companion was allowed to certain prisoners more guarded and cautious in their answers than others, this companion having drawn from them the requisite intelligence, soon appeared to be a spy placed there by the orders of the governor. The friend of the captive was kept in a state of fixed uncertainty. He was uncertain even for what cause he was detained. He was uncertain whether his wife and family yet existed, whether they breathed the vital air in the enjoyment of their liberty, or whether they were shut up in the next apartment of the castle doomed to the same misery which he endured. Of his own destiny he was equally uncertain. He might be confined to his dungeon for many years, still cherishing the hope, and meditating on the blessings of freedom, or a painful death might speedily terminate his existence. The morning returned and the evening came, the year revolved and passed over him in the same state of suspence and silence. Or roused at some time by the hope of liberty, offered to him on the conditions of acknowledging his guilt, and declaring his accomplices, he indulged perhaps in a momentary transport: but finding, that though the terms of the agreement had been adhered to on his part, his keepers had spoken only to deceive him; he often sunk into an unchangeable melancholy, which at length overpowered his reason. It is not possible for the language of men to describe this torture of the soul, which those victims of tyranny were in some instances compelled to undergo. Many of the prisoners, however, bore their sufferings with greater fortitude, or rather from a peculiarity of constitution, or from the power of habit, they suffered less than others who were unhappily placed in similar circumstances. They even contrived to amuse themselves during their confinement; though the methods which they adopted for this purpose appear to indicate little else than the sad necessity of their condition. The histories of the Bastile are full of attempts made to train spid
plying them with food, and to avert the ho
flection by ascertaining the dimensions of
or counting in different directions the stu
door. Some have spent whole days in po
from one dish into another, or in disposing
arrangements the pieces of which their fa
composed. After a certain time also th
confinement was in some degree abated.
ers were allowed to walk daily for an hou
the courts, though still within the view
on guard. If any stranger appeared,
obliged instantly to retire. By applying
tenant of the police, they might obtain
to attend mass, which was performed at
Sunday in the chapel belonging to the ca
were conducted separately from their apar
sat in covered niches, where they could h
being seen. Some were allowed the con
pens, ink, and paper, and were permitted
their friends; but all their letters passed t
hands of the lieutenant of the police, by
were frequently opened and read, so that f
reached the persons for whom they wer
They likewise had the use of books fro
founded by a prisoner in the beginning of t
tury, and augmented by the contribution
cessors. It consisted of about 500 volum
of the captives were permitted to read in
while others had the books brought to th
keepers. After much and frequent solici
guet, whose name has already been menti
quently, obtained the use of mathemat
ments; but on inspecting the case, he fou
compasses were exceedingly small, and ma

There is one passage in the history of
without which this branch of our artic
reckoned incomplete. We shall therefo
as few words as possible. Louis XVI.
mencement of his reign, ordered the regi
Bastile to be examined, and a number of
be set at liberty. The intelligence was re
surprise and unbounded joy. On one ol
it produced these effects in a very infe
He had been imprisoned for the space o
age had diminished his sensibility, and h
some measure, reconciled him to his situa
a strange voice announced his liberty, an
to depart, he appeared to be stupified, at
to say, or how to act. Recovering himse
he slowly quitted his dungeon, and rep
street where he had formerly lived: Bu
of his house remained, other buildings oc
place where it stood. His family and n
were all dead, or gone into foreign climat
even the most aged of those whom he acc
knew him, or could be brought to reco
the occurrences which he detailed, in or
their memory. A whole generation had p
and he found himself a stranger in the ver
he was born. An ancient domestic, to w
accidentally directed, at length recognis
tures of the master whom he had served.
he learned, that his wife had died thirty y

ne grief, and that his children had disappear-
out any visible cause. The old man groaned
e weight of such accumulated misery; and
ig himself before the minister to whom he
bted for his release, he bowed himself down
essed him in the following words: "Restore
to that prison from which you have taken
cannot survive the loss of my nearest rela-
my friends, and, in one word, of a whole ge-
Is it possible in the same moment to be
of this universal destruction, and not to wish
h? This general mortality, which to the
nankind comes slowly and by degrees, has to
instantaneous, the operation of a moment.
ecluded from society, I lived with myself on-
here I can neither live with myself, nor with
race to whom my anguish and despair appear
dream. There is nothing terrible in dying;
dreadful indeed to be the last." This speech
bvious effect upon the minister. He order-
ncient domestic above alluded to still to at-
master, as he alone was able to converse with
he subjects of his lost children and friends.
man would talk of nothing else; for he
all intercourse with the world, and continued
the midst of Paris as much a stranger to so-
when he was confined in the dungeons of the
till death put an end to his existence.

nay now enquire what were those crimes for
ne severe retribution of the Bastile was des-
Were the dungeons of that castle, which stood
the terror of France and the disgrace of Eu-
ed with assassins and traitors, with wretches
plotted against the welfare of their country-
longed to riot in the plunder which they might
If this were the case, France must have
arded as peopled with conspirators; and that
which of all others most readily submitted to
of despotism, must have been almost wholly
d of rebels and murderers. But the case was
wise. The dungeons of the Bastile were often
pecially in later times, with innocent and
citizens, who had unjustly become the objects
nment, or with humble individuals, who, from
erior situation and limited means, could never
en formidable to the state.* Did a man,
tious in the discharge of his duty, refuse to
he principles of integrity and honour at the
d of the minister? he was instantly sent to
ile. Had any one the misfortune to incur
easure of a favourite mistress? he experienced
fate. If any purpose was to be served, or
ion to be gratified, even a word or a look
oned a sufficient cause of imprisonment. And
dual once shut up, might be allowed to re-
years in his cell, not because he continued to
cted or feared, but because he was forgotten.
sequence of all this was, that men lived in
apprehension: They "were denied that in-
privilege, the free communication of their
thoughts and sentiments: Dissimulation became necessary for their safety. The towers of the Bastile seemed to stand aloft over the kingdom, for the purpose of scaring its inhabitants;" and on each of them might have been written the inscription sometimes to be found on grave-stones, *hodie mihi, cras tibi.*

It is remarkable, that the first prisoner confined in the Bastile was d'Aubriot, the architect who planned it. During the prosecutions on account of religion in the reign of Louis XIV., when the well-known edict of Nantz was revoked, and during the contests with the Jansenists under the administration of Cardinal Fleury, the annual number received was very great. Many of these were tried and executed; some perished in confinement, and others were set at liberty. Of all the prisoners, however, the most celebrated is the "man in the mask." He was brought from the island St Margaret on the 18th September, A.D. 1698, and immediately shut up in the Bastile. The mask, which he wore, was made of black velvet, and fitted with springs of steel, so that it was unnecessary to take it off when he ate. On his journey to Paris, those who conducted him had orders to put him to death if he made the smallest attempt to shew his face, or otherwise to discover himself. Historians have been so lost in probabilities while endeavouring to ascertain his name and quality, that to this hour it is doubtful who he was. There is reason to believe that he was a person of the first condition: He could read and write; attainments not common at the period in which he lived. He understood music, and could play on the guitar. When at St Margaret, the Marquis de Louvois, who went to visit him, spoke to him standing with every testimony of respect: And, in the Bastile, the governor very rarely sat down in his presence. His dress was sumptuous, and his table furnished with the utmost care. On one occasion he wrote something with his knife upon a plate, and threw it out from the window of his apartment; but the plate was found by a fisherman who could not read, and who carried it without delay to the governor. The ignorance of the fisherman was the cause of his safety; for after a few days confinement the governor dismissed him, saying, "You may rejoice that you cannot read." It is probable that the name and some account of the unknown person were written on the plate. This happened at St Margaret. The illustrious and unfortunate prisoner with the mask, died in the Bastile A.D. 1704. Immediately after his death, his clothes, linen, and all his apparel, were burnt with the most anxious care: the very floor of his apartment was scraped and taken up, and every vestige of his existence annihilated. The most plausible conjecture with respect to him is, that he was the twin brother of Louis XIV.; but for the reasons on which this conjecture is founded, as well as for other information, we must refer to the *History of the Bastile.* Appendix No. vi.

In the heat of the French Revolution, the Bastile

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e register of prisoners for the year 1687, we find the name of Laurence Lemiere, *shoemaker*, who was confined, to-
h his wife, "for dangerous discourse about the king." And in the register for 1690, that of John Blondeau, a her-
uspected person."

Bastinado.

was taken by the mob of Paris, and afterwards levelled with the ground. There were only seven prisoners found in it; these were Tavernier, (deranged), Pujade, La Roche, Caurege, Bechade, (imprisoned on account of a forgery in which they were engaged), Le Comte de Solages, (arrested at the request of his father) and White an Englishman, (deranged.) Reflecting on the memorable atchievement, Mr Cowper breaks out into the following apostrophe, with which we shall conclude the article:

> Ye horrid towers, the abode of broken hearts,
> Ye dungeons and ye cages of despair,
> That monarchs have supplied from age to age
> With music, such as suits their sovereign ears:
> The sighs and groans of miserable man:
> There's not an English heart that would not leap
> To hear that ye are fallen at last!

See *Histoire de l'Ancien Gouvernement par* M. Le Comte de Boulainvilliers, tom. iii. *Memoires de la Porte. La Bastile Devoilée*, passim. *The History of the Bastile. Essais Historiques, par* M. de St Foix; and *Memoires sur la Bastile, par* M. Linguet. (*h*)

BASTINADO, Bastonado, or Bastonade, a kind of punishment inflicted with a rod, or staff. This mode of punishment was common among most of the ancient countries, and is still practised in many of the eastern nations. In all the provinces of the Ottoman empire, the bastinado is the common punishment for theft, and other delinquencies of a more trivial nature. The criminal is stretched on his back upon a board, with his hands tied, and his ankles confined by a wooden machine. The legs are then raised, while two men, one placed on each side, alternately beat the bare soles of the feet, with a rod about the size of a small walking stick. The bastinado is sometimes a very slight punishment, but is inflicted at other times with barbarous cruelty. The number of strokes is specified in the sentence, amounting sometimes to 400 or 500; but it is usual for some person present to intercede in favour of the offender, before he has received the full number; for the punishment is inflicted, if not in the judge's presence, at least within his hearing. This punishment is accompanied likewise with a kind of fine; for the person on whom it is inflicted pays so much for every blow, both to him who gives and to him who counts them. In China, the bastinado, though sometimes very smartly applied, is the slightest kind of punishment, used only in case of very trivial crimes. It is often inflicted, by the emperor's direction, on his courtiers, who receive it as a particular mark of his gracious and paternal care, and are afterwards received into authority, and treated with distinguished respect. Every mandarin has the privilege of inflicting this punishment at pleasure, either when he administers public justice, or when any person neglects to greet him with the accustomed salutation. When he sits in judgment, or gives a public audience, a bag, filled with small sticks, lies on a table before him, and he is surrounded by a number of petty officers, provided with the baton, or pan-tsee, employed in bastinading. Taking from his bag one of the little sticks which it contains, he throws it down on the hall, towards the culprit whom he wishes to be chastised. His officers seize the criminal, and stretch him at full length, with his belly towards the ground; he is stripped bare to the heels, and receives five smart blows from the most athletic of the attendants; another succeeds, and bestows an equal number, if the mandarin pulls forth another small stick from the bag, which is the signal when he wishes the punishment to be continued. The person thus chastised then throws himself upon his knees before the judge, inclines his body three times towards the ground, and thanks him for the fatherly charge which he takes of his education. See Guer's *Mœurs et Usages des Turcs*, vol. ii. p. 162. Russel's *Aleppo*, vol. i. p. 334. Grosier's *China*, vol. ii, p. 52. Chantreaux's *Travels in Russia*, vol. i. p. 117. (*μ*)

BAT, an animal of the mammalia tribe, an account of which will be found in the article Mammalia. The bats in Senegal are eaten by the negroes, and are generally as large as pigeons. Their wings are very long, and they are furnished with five or six pointed hooks, by which they fix themselves together, and hang like large bundles from the branches of trees. Mr Bolingbroke, in his voyage to Demarara, mentions a very singular anecdote of the bats of that country. When the inhabitants are asleep in their hammocks, and their feet accidentally uncovered, the bats often open the veins of their feet without disturbing them, and suck till they are satisfied. When the victim of their attack awakes, he finds himself faint, and his feet bathed in blood. These animals make similar attacks upon cattle. See Durand's *Voyage to Senegal*, chap. v.; and Bolingbroke's *Voyage to Demerara*, chap. xii. See also *Vespertilio*, Mammalia *Index*. (*π*)

BASTION. See Fortification.

BATALHA, a small village in Portugal, about 60 miles north of Lisbon, where a famous monastery, the place of sepulture of the royal family, is situated. Don John, the first of the name, and tenth king of Portugal, on being attacked by the king of Castile with a powerful and greatly superior army, invoked the protection of the Virgin, vowing to consecrate a magnificent monastery to her honour should he prove victorious. Having defeated his adversary, and reduced the whole kingdom to tranquillity, he founded the monastery of Batalha in 1385, which he designed should be the most splendid in all Christendom. It was at first endowed for 30 monks, but there are now 44. The architect under whom the monastery was built is said to have been an Irishman named Hacket; and, at this day, it is one of the most elegant Gothic edifices in Europe. It is adorned with a profusion of ornaments in the richest taste, some of which are hieroglyphical, or mystical, and inexplicable by the learned. These are particularly conspicuous on the mausoleum of the founder. On the tombs of several illustrious branches of the royal family, interred here during the 15th century, besides figures merely ornamental, is seen the order of the garter, which they had obtained from the sovereigns of England. This monastery was amply endowed, both by foreign princes and those of Portugal. When the emperor of Constantinople, *Emanuel Paleologus*, was at Paris, in 1401, soliciting the assistance of the Christian powers, he transmitted a singular collection of precious relics, along with a certificate respecting them under his own hand, which we believe is still extant. In 1755, the edifice was damaged by the fatal earthquake which destroyed the capital, and the spire of the founder's mausoleum was overthrown. For a more ample account of this structure, which is considered a model of pure Gothic architecture, see Murphy's *Plans, Elevations, Sections, and Views of the Church of Batalha;* Louis de Sousa's *History of the Royal Monastery of Batalha;* and Link's *Travels in Portugal,* chap. xxv. p. 280. (*c*)

BATAVIA, the capital of the Dutch settlements in the East Indies, is situated on the north coast of the island of Java, at the mouth of the river Jacatra. It lies in the bosom of a large and commodious bay, which is so sheltered from the violence of the wind, by eighteen islands scattered along its mouth, that it is considered one of the safest harbours in the world, and so capacious, that a thousand sail of ships may ride there in safety. The city is surrounded with a broad wall, fortified by twenty-two bastions, and a deep moat which can be filled at pleasure with water from the river. All the avenues on the land side are protected by forts and redoubts, erected at a considerable distance from the town. These are mounted with brass cannon, and are built entirely of square stones. The approach by sea is commanded by a horn-work, commonly called the "Water fort," mounting fourteen guns and two howitzers; and the entrance of the river is defended by the citadel, and several strong batteries of six or seven guns each. There is also a fortification upon Onroost, one of the islands in the mouth of the bay, which completely commands the channel forming the principal passage into the road. Upon this island the Dutch have established extensive dock-yards, where every thing necessary for building, equipping, and preserving the company's ships, is provided in such abundance, that they can build, repair, and refit their vessels, without the least loss of time, and in the most complete manner. The citadel, situated on the east bank of the river, is a regular square fortification, built of coral rock, and flanked with four bastions. It contains the palace of the governor general of the Indies, as also the apartments of the counsellors, and other principal officers of the company. The arsenals and magazines are generally well furnished, and always contain stores and ammunition sufficient for a regular siege. The city itself, though it has been highly admired for the beauty of its buildings, and on account of its immense trade, has acquired the appellation of the "Queen of the East," contains nothing of elegance or design particularly worthy of notice. Its town-hall, its hospitals, and its churches, require no description. They are such as we see every day in our own country. The streets are straight and regular, overshadowed and embellished with large trees, which are planted on each side. They are twenty in number, and run from 114 to 204 feet in length. The houses, which are chiefly built of brick, are commodious and handsome. The windows and doors are wide and lofty, and the ground floors are laid with flags of marble, which, being frequently sprinkled with water, produce a coolness in that burning climate particularly refreshing. The form of the city is an oblong square, about three quarters of a mile long and half a mile broad, intersected by the river Jacatra, which runs through the middle of it, from south to north, and which is crossed by three bridges. In its passage it forms fifteen canals of running water, which are all faced with free stone, and whose banks are beautifully adorned with evergreen shrubs and plants. The breadth of the river within the walls is from 160 to 180 feet. At its mouth are two large piers of wood and brick work, running about half a mile into the sea, between which 100 slaves are constantly employed in clearing out the mud which is washed from the town, and which otherwise would choke up the channel of the river. The suburbs are very extensive and populous, and are inhabited chiefly by Chinese, and the natives of the island.

The environs of Batavia, to a considerable extent, present one universal garden, intersected with rivulets and canals, overshadowed with lofty trees, and interspersed with magnificent villas. The Dutch have here indulged their national taste to its full extent. Every spot is covered with verdure, and the most luxuriant foliage. Whatever can satisfy the palate or delight the sense, is produced in abundance. Fruits of every description grow almost spontaneously, and without culture; and could we but forget the danger which life is every hour exposed to, from the insalubrity of the climate, we might regard this place as the most delightful region in the world. But in the midst of plenty, beauty, and gaiety, every countenance indicates debility and languor. To use a strong expression, it is the work-shop of death. There is pestilence in the air, and poison in the water. The atmosphere is continually infected with deleterious vapours, which rise from the surrounding swamps and morasses; and the trees, with which the quays and streets are crowded, impede the free circulation of the air, and retain the putrid effluvia, which otherwise would in some degree be dissipated. Fevers, which are here the general denomination for all kinds of illness, are continually raging in the colony. The disorder at first is a tertian ague, which, after two or three paroxysms, becomes a double tertian, and then a continued remittent, that frequently carries off the patient in a short time. Hence it happens, that preventive medicines are taken as regularly as food, and every one expects the returns of sickness, as we do the seasons of the year. The inhabitants have thus become familiar with death, and hear of the loss of a friend without either surprise or concern. Of strangers who come to settle at Batavia, three out of five are reckoned to die the first year; and it appears, from calculation, that the company lose annually one-fifth of their servants. The climate, however, is not the only enemy to Europeans: the mortality is greatly increased by the voluptuousness and luxurious effeminacy in which many of them indulge. The change from a life of temperance to that of irregular indulgence, added to the sudden transition from a northern region to the torrid zone, independent of the noxious circumstances which are peculiar to the climate, cannot fail to

Batavia.

produce these fatal effects for which this place is so remarkable. And such is the general apprehension of the unhealthiness of this colony, that even the temptation of quickly amassing a splendid fortune is insufficient to induce those who can reside at home with any comfort, to seek a settlement in Batavia. Many offices and professions are thus necessarily entrusted to persons little qualified for fulfilling their duties; and it is worthy of remark, that one of the clergymen and the principal physician had originally been barbers.

Of a population, amounting to 110,000, exclusive of women and children, scarcely 5000 are Europeans; and of these, not one-fifth are Dutch, the greatest number being Portuguese and French. The rest are composed of a great variety of Indians, who are all under chiefs of their own nation, such as, Chinese, Javanese, natives of the island, Malayans, Amboynese, Mardykers, Baliers, Bouginese, Masassars, &c. The Chinese are the most numerous enemies to idleness. They seem born for the bustle of active commerce. They are indefatigably industrious, and will submit to any drudgery, however laborious, that is attended with a certainty of gain. Cunning, however, and deceitful to the last degree, they take a pride in imposing upon Europeans; and, boasting of their dexterity, they tell you, that the Dutch have one eye, but the Chinese have two. They keep all the shops, and most of the inns in the city, and are in general the farmers of the duties, excises, and customs. The Javanese apply themselves chiefly to agriculture and ship-building; and the Malayans to fishing. This last is a most wicked and profligate race. They profess to be Mahometans; but are absolutely void of morals, and would commit murder for the most trifling reward. Their last chief was publicly whipped and branded for his villanies: since which they have been ashamed to choose another. The Amboynese, a bold, boisterous, and turbulent people, are not allowed to live in the city, but are confined to a certain quarter of the suburbs. They are generally employed in building houses of bamboo, with windows of split-cane, which are very neatly wrought in different figures. The Mardykers are of various trades, as merchants, gardeners, graziers, poulterers, &c. Few of the free-Indians, however, are employed in domestic or menial services. These are chiefly employed by slaves, which are annually imported from Sumatra and Celebes.

All the dominions, which the Dutch possess in the East, are governed by two supreme councils; the council of the Indies, and the council of justice, both of which are fixed at Batavia. To the first of these belongs the entire direction of public affairs; and to the latter, the administration of justice in all its branches. But the citizens and free-merchants are amenable only to the tribunal of the city of Batavia; which is composed of eight aldermen and a president, who is always a counsellor of the Indies. The governor-general, who presides in the council of the Indies, is in a manner the sovereign of all the countries belonging to the company. He possesses unlimited authority; is allowed a court, and most of the honours of majesty; and so great are the legal emoluments of his office, that without oppressing the people, or burdening his conscience, he is able to raise an immense fortune within two or three years. He is, however, removeable at the pleasure of the directors at home, and, in case of treason, or other enormous crimes, the council of justice have a right to seize his person, and call him to account.

The ecclesiastical government of Batavia resides in eleven members of the reformed religion. Liberty of conscience is granted to every denomination of religionists, though not liberty of worship: Mahometans and Pagans are tolerated by government; and even the Chinese have their temples, in which they worship the Devil under the figure of a gigantic colossus, sitting cross-legged with an enormous belly hanging over his knees; but the exercise of the Roman Catholic religion is obstinately prohibited.

The regular establishment of troops at this colony seldom exceeds 3000 men, of which 700 only are Europeans; yet very few of these are furnished by the Dutch. They are chiefly Germans, many of whom, it is said, have been kidnapped into the service. The irregulars are very numerous, consisting of Chinese and natives of the island, who are commanded by their own officers. All the white inhabitants, however, are trained to the use of arms; for no person can settle here but as a soldier in the company's service, and he must serve a certain time before he is allowed to enter into any branch of trade. But the whole of their force is very inefficient for the defenc of the settlement: and the Dutch depend more upo the insalubrity of the climate, than the strength o their arms for repelling a hostile invader. The whol establishment of the company in 1777 consisted o 613 persons in civil, and 35 in ecclesiastical employments, 99 surgeons and assistants, 125 belonging t the artillery, 875 seamen and marines, 1571 soldier and 903 mechanics; in all, 4221 Europeans, besid 703 natives in their service.

The bay and harbour of Batavia are excellent adapted for commercial navigation. The trade co sists chiefly in the valuable productions of the islan such as pepper, rice, sugar, cotton, and indigo; an as Batavia is the emporium where all the merchandi of the Dutch company in India is deposited, the i port and export duties are very considerable. Y the revenues of the colony are altogether inadequa for its support. This city being the seat of gover ment, the charges of the Company's civil establis ment, as also of the military and marines, are defray out of the treasury of Batavia. On this account considerable balance appears every year against i and in 1779 the charges exceeded the receipts b £51,327 sterling.

The establishment of this colony upon the ruins a royal city, in opposition to the efforts of the Englis and afterwards to the united forces of the populo empire of Java, and its consequent prosperity, affor us a striking example of what may be effected b courage and perseverance. When the Dutch fir visited this island, the residence of the king of Jac tra was an inconsiderable village pallisadoed wi bamboo canes. Having entered into an alliance wi this prince, they contracted with him for the produc of his little territory, which consisted chiefly of pe

But afterwards suspecting him of a breach of
h, they built a strong fort in the neighbourhood
we him into justice. This raised the jealousy of
English, who had also some correspondence
the people of Jacatra, which soon kindled into
war. The fleets of the two nations engaged
short distance from the fort, when the Dutch
completely defeated. The English then took
ession of Jacatra, and upon an eminence in the
dle of the town established a magazine, which
fortified with a considerable number of heavy
on. Vanden Broecke, the Dutch commander of
Maurice, being hard pressed for want of am-
ition and provisions. threw himself under the pro-
ion of the governor of Bantam, who immediately
atched 2000 men to his assistance. The Ban-
se officer entered Jacatra, stript the king of all
gns of royalty, and drove him with his family,
less and poor, to a distant corner of the island,
re he dragged out his existence in the humble
dition of a fisherman. Peace being soon after
luded between the two Companies, the English
red from the island, leaving the Dutch in posses-
of Jacatra, but so completely under the power
he Bantamese, that Vanden Broecke and seventy
is men were carried prisoners to Bantam. This
vourable aspect of affairs, however, was soon
ged by the arrival of a Dutch squadron. Com-
re Koen after his defeat had retired to Amboy-
nd having received a strong reinforcement, re-
d in 1619 with a fleet of seventeen sail and a
derable body of troops. He ravaged and entire-
stroyed the town of Jacatra; and marching his
s to Bantam, demanded the restitution of Van-
Broecke and his companions. The Bantamese
rnor was in no condition to make resistance.
returned immediately to fort Maurice; and upon
uins of Jacatra, in the midst of fens and morasses,
nder a vertical sun, he laid the foundation of the
city of Batavia. National taste and national
dices seem to have dictated, in a great measure,
hoice of this situation. The Dutch were par-
the swamps of their native country; and they
y indulged the idea of enjoying, in an opposite
er of the globe, the muddy canals and shady
s of Amsterdam. The plan, however, was so
contrived, and, notwithstanding the local disad-
ges, the execution was so prompt and successful,
Batavia speedily became, and has ever since con-
d, the capital of the Dutch conquests and set-
nts in the East. But this colony had not only
counter difficulties at its first establishment; it
nued during its infancy to experience the most
ed opposition both from their countrymen at
, and from the inhabitants of the island. The
ror of Java, who had beheld with satisfaction
alousy between the Dutch and English, and had
an idle spectator of their hostility, now began
ke alarm at the growing prosperity, and gradual
achments of his ambitious neighbours. His
prompted him to the most decisive, but detesta-
neasures. He attempted to take off governor
by secret assassination: but that design failing,
ew together an immense army, and determined to
pate these daring intruders. In the beginning
of the year 1629, Batavia was invested by 200,000 Javanese; but the Dutch works were defended with such courage and conduct, that, after a siege of several months, they were obliged to retire broken and discomfited. The good fortune of the colony in this enterprise, however, was greatly overbalanced by the death of the governor-general, to whose wisdom and activity it had owed its existence and preservation; and they would probably have felt the effects of his loss more severely, had not a diversion happened in the island, which relieved them in a great measure from the apprehension of present danger.

Batavia.

The governor of Bantam having revolted from the Emperor of Java, assumed the title of king, and was supported in this quality of an independent prince by the government of Batavia. Two separate interests being thus formed in the empire, the Dutch, by dextrously playing the one against the other, were enabled not only to maintain their own power, but considerably to extend their territory; and though both sovereigns bore an invincible hatred to the colony, yet by taking advantage of their mutual animosity, they soon became so formidable as to defy the resentment of either. Not contented, however, with this precarious security, which the united efforts of the empire might annihilate, they contrived a scheme of freeing themselves entirely from future apprehensions, by getting into their hands the persons of the two sovereigns of the island. This scheme, the offspring of the most refined policy, was prosecuted by means the most deceitful and unjustifiable, and in the space of a few years was actually accomplished. A Dutch fort, manned with a strong garrison, and well fortified with cannon, overawes the capitals of Bantam and Java. A European guard even resides in the palace of their sovereigns, out of pure tenderness and respect; and they are made to believe, that these evidences of their subjection are solely for their honour and defence. The Dutch, however, have not been able to keep the emperor of Java in entire and strict submission. Wars have frequently arisen from a disputed succession to the throne; and they are constantly obliged to cajole him by splendid embassies, and costly presents. But they have no apprehension from his power. They have, in a manner, the absolute direction of his affairs, and are in possession of almost the whole trade of his dominions. As for the king of Bantam, he is as completely at their devotion, as the king of the Hottentots was at the Cape of Good Hope. The colony had thus become in a great measure masters of the island. Batavia had yearly increased in strength, beauty, and opulence, and could vie in splendour and power with the chief settlements in India. All fears of foreign hostility were now allayed, and they began to indulge the hope of domestic peace and settled security. But the natives were far from being reconciled to their authority. They made repeated efforts to drive them from the island, and to restore their sovereigns to independence. The avarice and injustice of the Dutch had sown the seeds of disaffection, and had excited even the hatred of their own subjects. And at a time when seeming tranquillity reigned around, they were upon the very brink of destruction, and thousands waited only the signal to take vengeance on their oppressors. A conspiracy of a most daring and dangerous nature had been for four years forming in the very heart of the settlement. It had been carried on with such determined perseverance, and managed with such amazing secresy, and so great was the number concerned in it, that its authors had reason to expect the most complete success. Catadia, a Javanese, and Peter Erberfeldt, a burgess of Batavia, were the original contrivers of this diabolical design, which was to surprise the city, and to put every European and Christian to the sword. The execution of their purpose was fixed for the first morning of 1722. The order of attack was prepared and delivered to the chiefs of the conspiracy; 17,000 men were engaged to insure its accomplishment; and they waited only the signal for striking the final blow, when on the day preceding this intended massacre the conspiracy was divulged, just in time to prevent the dreadful catastrophe. Twenty of the principal conspirators were seized without any noise, and all necessary precautions taken in case of any commotion in the city; but the confederates were so thunderstruck at the discovery, that not the least attempt was made for their rescue. The Batavian government, that they might not drive these people to desperation, prudently declined proceeding against the other accomplices, but were contented with the traitors, whom they had already in their power. Upon these, however, they took the most exemplary vengeance, and inflicted such a punishment as should deter all others from imitating their crimes. Erberfeldt and Catadia were condemned, "to be extended and bound each of them upon a cross, to have their right hands cut off, and their arms, legs, and breasts pinched with red hot pincers, till pieces of the flesh should be torn away. Their bellies were then to be ripped from bottom to top, and their hearts thrown in their faces; after which their heads were to be cut off, and fixed upon a post; and their bodies, torn in pieces, were to be exposed to the fowls of the air without the city, in whatever place the government should please to direct." *Sentence contre Pierre Erberfeldt, et ses complices, prononcée a Batavia en* 1722.

This terrible sentence, which scarcely the imminence and extent of the danger could justify, was executed without the least mitigation. Its severity, however, had not the desired effect. The growth of the treason was stopped, but the roots still remained; and eighteen years after the conspiracy of Erberfeldt, the Dutch proceeding upon mere supposition, committed one of the most inhuman massacres that has ever disgraced the annals of any nation. On the memorable morning of the 9th of October 1740, an order was issued by the governor and council, for immediately putting to the sword all the Chinese that could be found in the city. The garrison, and the sailors who were brought from the vessels in the roads, were tempted by the promise of plunder to execute the bloody edict. The houses were broken open, and the sleeping victims were torn from their beds and killed without distinction. In a short time the streets, rivers, and canals, were covered with dead bodies, and in some places the blood ran over the shoes of the murderers. A more shocking and horrible spectacle was never exhibited to mortal sight; and in this dismal tragedy there fell, according to the acknowledgment of the Dutch, no fewer than 12,000 Chinese; but according to other accounts, 30,000 men, women, and children. Of this transaction our limits will not admit of a more detailed account. Indeed no certain information can be obtained on the subject. The Dutch, it is true, have framed a story full of rebellion, insurrections, massacres, and fire. They have told us, that the Chinese had entered into a conspiracy to raise their chief to the government of Batavia, and to massacre all the Europeans in the colony except the governor and director-general, whom they intended to preserve for carrying umbrellas over the heads of the new governor and his lady! that the evening before the massacre 50,000 Chinese had attacked the city, set fire to the suburbs, and endeavoured to excite their countrymen within the walls to rise against the Dutch; and consequently that they were compelled, by the urgency of the danger, and as the only means left for securing the public safety, to have recourse to this most expeditious and effectual remedy. But though they have been openly charged with falsehood and exaggeration, and have even confessed that in their narrative many particulars were omitted, and promised a more full and distinct relation; yet these charges were never answered, nor has the promised relation ever appeared. All the accounts which have been received of this dismal scene, instead of explaining, have served only to cloud a transaction, dark and ambiguous, and which we doubt will never be brought to the public view in its true colours. From the subsequent conduct of the colony, however, we are warranted by pretty strong evidence to conclude, that they were actuated in this measure by very different motives than what they avowed to the world; and throughout the whole of this transaction we can easily trace the same grovelling spirit and detestable thirst for wealth, which dictated the horrid outrage against our countrymen at Amboyna. But the massacre, as soon as it was known in Europe, was also openly ascribed to the avarice of the governor, supported by such as were deeply indebted to the Chinese, who thought that cutting their throats was the easiest and most expeditious method of settling accounts; and the Dutch, so far from attempting to discredit the rumour, rather seemed willing to free themselves, by throwing the odium upon the governor. He was seized on his way home with all his effects, amounting to half a million sterling, and carried back to Batavia to abide a trial for the shameful abuse of his authority, and where he remained a prisoner until his death. The 50,000 Chinese who, it is said, continued to waste with fire and sword wherever they met with on the mountains, so far from being objects of terror and alarm to the Batavians, were invited by a general amnesty to return to the settlement, and in a short time they became as numerous as ever. Order and tranquillity having been restored to the distracted colony by the firm and wise administration of the new governor, the inhabitants soon lost all apprehensions of any future disturbance. The government, however, were afraid lest the perpetration of this outrage should excite the indignation of the emperor of China, and interrupt the amicable correspondence which had long subsisted between that country and Batavia; and, in the following year, sent deputies to apologise for the measure, on account of the necessity of the case. But the emperor, instead of expressing his horror and displeasure at the injuries and insults offered to his countrymen, calmly replied, "that he was little solicitous about the fate of unworthy subjects, who, in the pursuit of lucre, had quitted their country, and had abandoned the tombs of their ancestors." The Batavians, having again assumed their ancient dominion, continued to exercise it with more prudence and lenity. Nothing, however, has happened in the settlement worthy of recording. From that time it has rather been in a declining state, and, especially within these 50 years, has considerably fallen off both in population and opulence. When Sir George Staunton visited this place, many of the houses were untenanted, which by no means indicates a flourishing colony. The observatory formerly erected here is now entirely neglected, but the society of arts and sciences, founded under the administration of De Klerk, still subsists. The first volume of its memoirs was printed at Batavia in 1779. As Batavia derived its importance more from being the emporium of the Dutch commerce in India, than from its own resources, its decay may easily be accounted for by the severe losses which the Dutch have of late sustained in that quarter; and we may with safety assert, that as long as Britain maintains her dominion in the east, Batavia will never recover her ancient splendour and mangificence. East Long. 106° 51′ 15″, South Lat. 6° 10′. See *Mod. Un. Hist.* vol. x. p. 301—568. Stavorinus' *Voyages*, vols. i. and iii. Staunton's *Account of Lord Macartney's Embassy to China*, vol. i. *Voyages de* Nicolas Graaf, *aux Indes Orientales*, p. 214, &c. (*p*)

BATAVIAN REPUBLIC. See HOLLAND.

BATCHELOR. See BACHELOR.

BATCHESERAI, more properly BAKTCHESERAI, or BACHTCHESERIA, the ancient residence of the Khans of the Crimea, is situated, like Matlock in Derbyshire, on the rugged flanks of two high mountains, and on the interjacent valley, which is watered by the rivulet Dshuruk-su. The hanging gardens, the towers of the mosques, the black Italian poplars, the terraces, and bubbling fountains, contribute to the beauty of this picturesque town. The principal street, which is nearly a mile and a quarter long, consists of two rows of miserable wooden shops, which are kept by Karait Jews, who live at Dschoufoulkale, a town about a mile and a half from Batcheserai. They repair to their shops on horseback every morning, and return to their houses in the evening. The palace of the Khan is situated in the centre of the town near the Dshuruk-su, on the edge of a quay. A stone bridge across this rivulet conducts the traveller to a gate opening into the outer court; on the left hand is a large and handsome mosque which belonged to the Khan, and farther on are the stables, while the palace appears on the right. It is only one story high, having several fronts of different altitudes, with roofs of various forms. On the slope near the palace is a fruit garden, divided into four terraces. The cemetery which contains the bodies of the khans and their families is behind the mosque. The favourite residence of the khan was a magnificent edifice, delightfully situated beneath a mountain on the slope of a beautiful vale; but the wanton barbarity of the Russians was fatally displayed in the total destruction of this and the other ornaments of Batcheserai. The fountains of this city, which amount to 75, are seen in every part of the town discharging the most limpid water, and the Tartars repair to them four times a day to perform the ablutions which their religion demands.

Batcheserai contains about 31 mosques, a few cutlers shops, a manufactory of red and yellow leather, and some of felt carpets. The houses are built of wood and ill-baked bricks, having wooden piazzas and sloping roofs of red tile. Population 5776, consisting of Tartars, Jews, and Arminians. A full account of the palace will be found in Dr Clarke's *Travels in various countries of Europe, Asia, and Africa*, Part i. p. 464—485; a work full of new and interesting information. See also *Travels in the Crimea*, &c. in 1803, by Reuilly, who visited this country after Dr Clarke; Pallas's *Travels*, vol. ii. p. 29. and DSCHOUFOULKALE′. (π)

BATCHIAN, BACHIAN, BAKIAN, or BAISAN, is the largest of the lesser Molucca islands, about 12 leagues in circumference. It is under the dominion of a sultan pensioned by the Dutch, who is likewise sovereign of Ouby and Ceram, with Goram, a little isle south-east of Ceram, containing 13 mosques, and reckoned the most eastern boundary of the Mahometan faith. This island abounds with all kinds of animals, and fruits of every species; and in tobacco and sago, on the latter of which the inhabitants subsist. The historian of the conquest of the Moluccas describes Batchian as a wild and desert country, in consequence of the indolence and oppression of the inhabitants, though, at the same time, capable of high cultivation. The cloves of Batchian were once reckoned the best in the Moluccas; but they are no longer collected in any quantities. The island contains a burning mountain; and immense rocks of coral decorate its shores. East Long. 125° 5′, and S. Lat. 0° 25′. (*j*).

BATGAN, a city of Hindostan, in the kingdom of Nipal, which forms an immense plain that separates the mountainous tract called Bindachul from the extensive Alpine region called Hemachul. Batgan is the third principal city of this kingdom, and lies about ten miles south of the capital Catmandu. It is said to contain about 12,000 families; but this estimate is obviously exaggerated. East Long. 85° 15′, and North Lat. 27° 20′. See Giuseppi Bernini's *Account of the Kingdom of Nipal*, in the *Asiatic Researches*, vol. ii. p. 308. (*q*)

BATH, the *Aquæ Solis* of the Romans, is a city of England, in Somersetshire. It is beautifully situated on the river Avon, on the side of a narrow valley, bounded by hills on the north, south, and south-west, and widening on the north-west into rich and extensive meadows.

After the Romans had reduced to subjection the Belgic colonies and the western parts of Britain, they were allured to the spot where Bath now stands by the excellence of its situation, and by the warm springs which spontaneously flowed from the earth. Finding that they could indulge without trouble or expense in all the luxuries of the warm bath which they had enjoyed in their native country, they dignified the hot springs with the appellation of "the "Waters of the Sun." The first detachment of the second legion was stationed at Bath; and after the successive arrival of other divisions of the Roman army, the town increased in size till it became the principal city in that part of Britain which was subject to the Romans. The form of the city was nearly pentagonal, having its greatest breadth about 380 yards, and comprehending an area of nearly 4000 yards. The wall which inclosed it, consisted of layers of stone, brick, and terras, about ten feet thick, and twenty feet high; and were flanked with a tower at each angle. Two grand streets, intersecting each other, and dividing the city into four parts, terminated in four gates, facing the cardinal points of the horizon. Temples and magnificent baths, the remains of which were discovered in the year 1755, combined to give elegance and splendour to this Roman station. Bath underwent many changes during the numerous wars and revolutions which mark the history of England, but most of them are of too insignificant a nature to be detailed in a work like this.

Bath has been long regarded as one of the finest towns of England, on account of the beauty of its streets and the magnificence of its public buildings. The Royal Crescent, which is of an elliptical form, and contains thirty houses, forms one of the finest assemblage of buildings in the kingdom. A single order of Ionic pillars supports the superior cornice, and the houses command a delightful prospect of the greater part of the city. Queen-square, Marlborough Buildings, Lansdown Crescent, Catherine Place, and River Street, are also remarkable for their elegance and excellent situation. The old assembly rooms, built in 1750, are about 90 feet long, 36 broad, and 34 high, and enjoy a beautiful prospect of the Avon, and the surrounding hills. They are surpassed, however, in size and elegance by the new assembly rooms, which were opened in 1771. The ball room is 106 feet long, 42 feet wide, and 42 feet high. One of the card rooms is an octagon, 48 feet in diameter; and the other is rectangular, being 70 feet long, and 27 feet wide. The theatre was designed and erected in 1768, by Mr Palmer, who obtained his majesty's letters patent for dramatic entertainments. The guildhall, of which the foundation stone was laid in 1760, is a very handsome building; and the common council room is adorned with several portraits of public characters. The circus is a grand circular pile of uniform buildings, with three openings at equal distances, leading into different streets. The fronts of the houses are decorated with three rows of columns, in pairs, of the Doric, Ionic, and Corinthian orders, having the frize adorned with sculpture; and in the centre is a reservoir of water, collected from the surrounding springs. The General Hospital is an elegant building, 100 feet long and 90 deep, and capable of accommodating 100 patients. It is supported by voluntary contribution, and receives from every part of the world any invalids that desire benefit from the Bath waters. St John's Hospital, founded in 1180; St Catharine's Hospital; Bellot's Hospital; the City Dispensary and Asylum; the Casualty Hospital; the Puerperal, or child-bed charity; and the Stranger's Friend Society, are the other benevolent institutions, which the wealthy inhabitants of Bath have provided for the relief and comfort of the poor.

Besides the public grammar school, and other establishments for the instruction of the ignorant poor, Bath contains two excellent institutions for the promotion of science and the arts. The Bath and West of England Society was established in 1777, by Mr Edmund Rack, for the encouragement of agriculture, manufactures, commerce, and the arts. The volumes of its Transactions, which have already appeared, evince the utility of the institution, and the activity of its members. The Philosophical Society was established in 1799, for the diffusion of science and literature.

The principal churches in Bath are the Abbey Church, St James's Church, St Michael's Church, and Walcot Church. The Abbey Church, which has the form of a cross, is about 210 feet long, from north-east to west, and 126 from north and south, with a breadth of 72 feet. A magnificent tower, about 162 feet high, rises from the centre of the building, and gives a dignified appearance to this beautiful specimen of English architecture. The richness of the west window, the arched doorway, which forms the western entrance, the roof of the building, and the marble monuments within, are deserving of particular attention.

There are here four public baths, viz. the King's Bath, the Queen's Bath, the Cross Bath, and the Hot Bath. The King's Bath is 65 feet long and 40 broad, and contains more than 346 tons of water when it stands at its usual height. The spring which fills it rises from the centre, and is inclosed by a brass hand-rail of a[illegible] octagonal form, while the whole bath is surrounded by a beautiful colonnade of the Doric order. The Queen's Bath, which is attached to the former, and receives its water from it, is a bason 25 feet square. The Cross Bath, which was so called from a cross erected in its centre by the Earl of Melfort, is of triangular form, and is situated at the extremity of Bath Street. The Hot Bath, which is about 4[illegible] yards south-west of the King's Bath, is about 5[illegible] feet square, and is remarkable for the great heat of its water, which is 117° of Fahrenheit. Besides these there are several private baths, which are not worthy of particular notice.

The Bath water has a gentle chalybeate taste, which completely disappears as soon as the water cools. The portion of iron which enters into its composition, does not exceed a grain in a gallon of water. The Bath water is also hard, and besides a little calcareous earth, and a small portion of azotic gas, [illegible] holds in solution a small quantity of silex. It contains also about $\frac{1}{20}$ of its bulk of carbonic acid. The diseases in which the Bath water is supposed to be useful, are gout, palsy, rheumatism, and diseases of the urinary organs. Bath contains 3619 houses, and 27,686 inhabitants, of whom 10,521 are males, and 17,165 females, 6103 being employed in trade. West Long. 2° 22′, and North Lat. 51° 23′. See *Phil. Trans.* 1767, vol. lvii. N° 22. Gibb's *Treatise on the Bath Waters.* Warner's *History of Bath.* (j)

BATH, KNIGHTS OF THE, an order of knights

the ancient custom of bathing on the
to their installation. The origin of this
t as remote as that of the feudal system
t was one of the highest honorary dis-
g the ancient Franks, and was confer-
t solemnity, as at once the reward and
extraordinary purity and virtue. Per-
to receive this honour, were obliged
ils, previous to which they underwent
emblematical of their resolution to pre-
ds pure and uncorrupted. At the same
ne under a solemn obligation to brave
the cause of virtue, and to adhere scru-
e belief in the Trinity, implied in their
uncta in uno. It seems probable, from
s of some antiquarians, that this order
d was introduced into England by the
Ir Anstis has fully ascertained that Wil-
queror, and his successors, were in the
nferring it both in their Norman and
nions. It can scarcely be said, however,
properly instituted in England till the
Henry IV., who, on the day of his coro-
red that dignity upon 46 esquires. From
l the reign of Charles II., it was the
of the kings to create knights of the
coronation, at the inauguration of the
Vales, and at the celebration, either of
tials, or those of any of the royal family.
n 68 knights of the Bath were installed
. at his coronation; but from that time
s discontinued, till it was revived by
the year 1725. That monarch, deter-
ore it in more than its former lustre,
a regular military order, to consist of
er, and 36 companions, a succession of
o be regularly continued. This order
erned by particular statutes and ordi-
of them impressed with a seal engraven
having upon one side the figure of the
back, and clad in armour, the shield

Bath, Knights of.

azure, three imperial crowns, or the arms ascribed to the renowned king Arthur, with the circumscription, SIGILLUM HONORATISSIMI MILITARIS ORDINIS DE BALNEO; and on the reverse, the same arms impaling the royal arms. The officers appropriated to the order, are, besides the grandmaster, a dean, genealogist, king of arms, register, secretary, usher, and messenger. The dean of the collegiate church of St Peter's, Westminster, for the time being, is *ex officio*, dean of the order of the Bath; the other officers are appointed by the grand master, under the seal of the order.

The badge of this order is a rose, thistle, and shamrock, issuing from a sceptre between three imperial crowns, surrounded with the motto, *Tria juncta in uno*. It is of pure gold, chased and pierced, and is worn by the knight elect, pendant from a red ribbon across the right shoulder. The collar is also of gold, weighing 30 ounces troy weight, and is composed of nine imperial crowns, and eight roses, thistles, and shamrocks, issuing from a sceptre, enamelled in their proper colours, tied or linked together with 17 gold knots, enamelled white, and having the badge of the order pendant from it. The star consists of three imperial crowns of gold, surrounded by the motto upon a circle of red, with rays issuing from the silver centre forming a star, and is embroidered on the left side of the upper garment. The installation dress is a surcoat of white satin, a mantle of crimson satin lined with white, tied at the neck with a cordon of crimson silk and gold, with gold tassels, and the star of the order is embroidered on the left shoulder; a white silk hat adorned with a standing plume of white ostrich feathers, white leather boots, edged and heeled, spurs of crimson and gold, a sword in a white leather scabbard, with cross hilts of gold. Each knight is allowed three squires, who must be gentlemen of blood, bearing coat armour. These esquires are entitled during life to all the privileges and exemptions enjoyed by the esquires of the sovereign's body, or the gentlemen of the privy chamber. (μ)

BATHING.

or the act of applying water, under
and modifications, to the surface of the
bject of such acknowledged importance,
eral interest, as to demand, in a work on
literature, a much fuller consideration
sually obtained. In the present article,
avour to give as complete and popular a
subject, as is compatible with the nature
our undertaking. We propose, first, to
several *varieties* of baths, and the *effects*
roduces on the human body in its natural
; thence to deduce some practical con-
precautions on the use of bathing, in
tion of health and the cure of disease;
ude with a brief historical sketch of the
athing among various nations, both in an-
dern times.

Bathing.

Nature of baths.

The term *bath* has, by many writers, been employed in a very extensive sense, as comprehending not only every kind of liquid in which the body can be immersed, but *air*, *earth*, *sand*, and other dry materials by which it can be surrounded. Thus, we hear of baths of *milk*, *whey*, *broth*; and if we may credit the fables of mythology, and the legends of monkish superstition, even *human blood* has been employed in this capacity. When the naked body is exposed for a considerable time to the cold air, this is termed the *air-bath*, a practice recommended by Franklin and others as a substitute for *bathing*; and when the naked body is surrounded with sand, or half buried in the earth, as has been practised on various occasions, both by regular physicians and empirics, it is said to be placed in a *sand-bath*, or an *earth-bath*. However convenient these terms may be in a medical point of view, they do not seem suited to the general purposes for which this article is intended; and we shall accordingly confine ourselves entirely to those species of bathing, in which water, under some form or other, is the agent employed.

Varieties of baths. The water of which baths are composed may be nearly pure, or it may be naturally impregnated with various mineral substances; it may be possessed of very different degrees of temperature, from near the freezing point to a heat considerably above that of the human body; and it may be applied universally to the whole surface, or only partially to particular regions. These circumstances constitute the principal varieties of baths, which we are now to consider.

1st, In respect of composition. The water which flows in small rivers, brooks, or *burns*, or which fills ponds, lakes, canals, and conduits, and to which recourse is very commonly had for the purposes of bathing, may be regarded as nearly pure, since it contains but little mineral impregnation. Its action on the surface, when of a medium temperature, must therefore be little more than that of a *detergent* or cleanser. Sea water, which is so commonly used for bathing, contains, besides *sea salt*, a considerable quantity of other saline ingredients, as *muriate of magnesia*, and *sulphate of lime*, the saline matters forming more than $\frac{1}{30}$ of the whole weight. Many other mineral waters are occasionally used for bathing; as those of Bath in England, Vichy in France, and Pyrmont in Westphalia, which are chalybeate; and Harrowgate in England, Moffat in Scotland, Aix-la-Chapelle in Germany, and Barege at the foot of the Pyrenees, which are sulphureous. The effects of these baths will depend on the nature of their impregnations, and shall be considered presently.

2d, In respect of temperature. By far the most important varieties of baths are those in respect of *temperature;* as, from the power of conducting or transmitting heat possessed by water,* and the large volume in which this element can be applied, its effect in increasing, and more especially in diminishing the temperature of the surface, and hence that of the whole body, must be considerable. Most modern writers refer the whole effects of bathing to the temperature of the bath; and though in this they perhaps generalise too much, it must be allowed, that the effects ascribed to impregnation are very trifling when compared with those which depend on change of temperature. In this respect, baths were formerly divided into *cold* and *warm;* but since the use of the thermometer has become more general, *four* degrees of temperature have been marked in baths, and these are now distinguished into *cold, tepid* or *temperate, warm,* and *hot.*

Cold Bath. The *cold bath* is that which possesses the ordinary temperature of the atmosphere in the temperate climates, varying from 32° to about 65° of Fahrenheit's thermometer. Between these degrees we may estimate the temperature of most of the natural waters employed for bathing. The water of pools and small rivers, indeed, sometimes exceeds 65°; while that of the sea in this climate seldom falls below 40°, and that of most springs in this country has generally a temperature of about 45°. It has been affirmed, that the water of springs that are inclosed for the purposes of private bathing is colder than that of open springs. We doubt whether this be a fact ascertained by actual experiment, and suspect the observation to have arisen from the fallacious circumstance of relative sensation. The principal natural springs employed for cold bathing in this country, are those of the Malvern hills in Worcestershire.

The *tepid* or *temperate bath,* is variously defined by authors. Dr Saunders† fixes the medium temperature of what he calls the tepid bath, at 90°; while Marcard‡ denominates a bath *cool,* when its temperature lies between 65° and 85°; and some of his commentators chuse to denominate baths within this range *tepid.* Perhaps they may more properly be called *temperate;* and the term *tepid,* which can chiefly apply only to the highest extreme of this range, might be omitted altogether. The temperate bath is usually artificial; but there are several natural springs of celebrity, which possess a temperature between 65° and 85°, and are employed as temperate, or tepid baths. Such are the springs at Matlock, Buxton, and Bristol hot wells in England. Of these, the coolest is Matlock, whose temperature does not exceed 66°; while that of Bristol is 74°, and Buxton is as high as 82°.

The *warm bath,* according to Marcard, is that whose temperature varies from 85° to 97°; while Dr Saunders ranks under this denomination all baths whose temperature exceeds 90°. We prefer the former definition; for, as we shall shew immediately, the effects of a bath below 98° are so very different from those of baths above that temperature, as to require an accurate discrimination. We do not know any mineral spring in this country that can be said to come under the present variety, though Bristol hot-well has been remarked as high as 84°, and the Cross-bath at Bath is sometimes as low as 94°, or even 92°. On the continent there are several baths of this description, but the most celebrated is that of Pyrmont.

When baths exceed the ordinary temperature of the human body, or 98°, they are denominated *hot baths.* It is scarcely possible to assign the utmost limit of these baths in point of *heat,* as this must depend much on the sensations of the patients. An artificial hot bath seldom exceeds 105°, but the heat of some natural springs used for hot bathing is very considerable. Thus the waters of the King's-bath at Bath are, at a medium, 116°; those of Vichy 120°; of Barege 122°; of Borset, in Germany, 132°; of Aix-la-Chapelle about 140°; while those of the Caroline baths at Carlsbad, in Bohemia, are as high as 165°. The heat of the baths at Baden, in Switzerlatter rapidly increasing, so as to cause the surrounding water to feel of an agreeable temperature. If the immersion have been sudden and momentary, and the body be immediately dried and covered from the air, the agreeable sensation of warmth continues, the whole body feels refreshed and invigorated, and, under favourable circumstances, the natural perspiration is increased. If, however, the immersion be continued for a considerable time, and the water be not near the highest range of the temperature which we have assigned to the cold bath, the sensation of warmth goes off, and is followed by numbness and shivering; the skin becomes pale and contracted; the vessels near the surface are evidently diminished in diameter, and their contents are either lessened in volume, or propelled with greater force towards the internal parts. The person feels drowsy and inactive; his joints become rigid and inflexible; his limbs are affected with pains and cramps; his respiration becomes quick and irregular; his pulse slow and small, but for a time firm and regular; his perspiration is suppressed; and generally a copious discharge of urine takes place. If the immersion be still continued, or if the water be very cold, the pulse gradually ceases at the wrist; the action of the heart becomes weak and languid; a sensation of faintness and coldness of the stomach is experienced, followed by a rapid diminution of the whole animal heat. At length delirium and torpor come on, and the person is carried off by a fatal apoplexy.

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* We are aware that chemists are not agreed respecting the manner in which heat is transmitted through fluids; some attributing the transmission to a conducting power possessed by the fluid, while others explain it on the principle of intestine motion in the fluid, by which its particles *carry* heat to each other. This question will be examined in our article CHEMISTRY; and in the mean time we shall express ourselves on this head so as to suit either hypothesis.

† Treatise on Mineral Waters, p. 444.

‡ *De la Nature et l'Usage des Bains.* French Translation, p. 7.

In the above description, we suppose that the body has been suddenly plunged into the water. If, as often happens with weak or timid people, the bather enters the bath slowly, and if the water be much below 60°, the sensation of cold is more striking; a shivering is produced; and, as the person advances, so as to make the water rise towards the belly and chest, a shuddering and convulsive sobbing take place, sometimes attended with sickness and headache.

When the cold bath is applied by way of *affusion*, its affects are generally more sudden and more transient, though, by repeated affusions, they may be increased and prolonged to any required extent. The degree of returning warmth, in this case, will depend on the circumstance of the body's being freely exposed to the evaporating action of the air, or protected from it by proper clothing.

Practical remarks.

The increase of animal heat, which so generally follows the sensation of cold experienced on the sudden application of the cold bath, is to be ascribed to that re-action of the system which enables it to resist an external impression by which it might be injured. This re-action is in proportion to the intensity of the cause by which it is excited, and to the vigour of the vital powers, of which it constitutes a peculiar effort. It is this re-action of the system which enables the body to derive advantage from the application of the cold bath; and, where the re-action does not take place, or takes place only in a small degree, the cold bath has been injudiciously or excessively employed.* Hence, where the system has been debilitated by long continued exertion or disease; where the temperature of the body is below the natural standard; or, where a profuse perspiration has come on, cold bathing should be avoided.

From what we have now stated, it appears, that the use of the cold bath is attended with three principal effects: a sudden and powerful shock given to the body on the first application; a sudden abstraction of heat from the surface; and the re-action of the system to counteract the shock, and to restore the diminished temperature. In its general and primary effect, therefore, the cold bath acts as a powerful stimulus to the whole system, and to this effect its advantages as a remedy are chiefly to be ascribed. It has been disputed, whether, from its abstraction of heat, the cold bath can properly be considered as a stimulant; but this question, like many others in philosophy and physiology, resolves itself into a mere verbal quibble, and it is not necessary that we should here discuss its merits. See Currie's *Medical Reports*, 3d edit. vol. i. p. 73.

It has been very commonly supposed, even by medical men, that immersion in the cold bath, when the body was considerably heated with exercise or other exertion, is a dangerous practice; and accordingly it is a general custom with bathers, who find themselves overheated, to wait till they are cool before they plunge into the bath. This opinion and this practice have been examined, and ably controverted, by Dr Currie of Liverpool, who has shewn, both from theory and experience, that the opinion is erroneous, and the practice injudicious. He has proved, that while the body preserves a temperature above the natural standard of 98°, and the strength is not exhausted, by perspiration and fatigue, the immediate use of the cold bath is not only safe, but salutary; and he was for some years in the habit of directing his infirm patients, to employ such a degree of exercise, before entering the cold bath, as might produce some increased action of the vascular system, with some increase of animal heat. See *Medical Reports*, vol. i. p. 111.

From the effects of the cold bath on the healthy body, we may deduce the following conclusions respecting its employment in the cure of disease:

The principal advantages to be expected from cold bathing, in a medical point of view, are, the reduction of excessive heat, and the producing a salutary re-action of the system. In the former way, it will prove beneficial in all those cases where the temperature of the body continues steadily above the natural standard: as in ardent fever, the hot stages of intermittents, the yellow fever of the West Indies; and in several febrile diseases, as in the early stages of scarlet fever, measles, and small-pox, so long as there is no appearance of eruption. The mode of application, in these cases, will depend on the strength of the patient; but, in general, affusion is more advisable, and more efficacious in reducing the morbid temperature, than immersion. Immediately after bathing, unless in those cases where the heat is very considerably above the natural standard, the patient protracted to twenty minutes or longer, according to the feelings of the patient; and after bathing, gentle exercise in the open air should be employed.

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* When, after the use of the cold bath, a person feels heavy, inactive, or chilly, or find himself affected with headache, or tightness across the chest, it is evident that it does not agree with him, or that he has continued in it for too long a time.

Cautions.

Those cases to which the warm bath is less applicable, are principally affections of the lungs, accompanied with great difficulty of breathing, and some organic affections of the internal parts.

Effects of the hot bath.

The effects of the hot bath differ in several particulars from those of the warm bath. The sensation of heat experienced on entering a bath above 98° is, in general, very striking and permanent. The pulse is increased in frequency and force; the superficial veins become turgid; the face is flushed; the respiration quicker than natural, and sometimes hurried and laborious; and the perspiration is increased.[*] If the heat of the bath much exceed 98°, or if the immersion be continued beyond a few minutes, the determination of blood to the head is greatly increased; the arteries of the neck and temples throb violently; a sensation of anxiety at the breast, threatening suffocation, comes on; the person grows giddy, and feels a fluttering at the heart. If these warnings of approaching danger be not attended to, the bather soon becomes insensible, and expires of apoplexy.

Water of this high temperature is scarcely ever employed in the way of affusion; nor is such an application likely to be attended with advantage, except in some paralytic affections of the limbs. In these cases it is not unusual, at Bath and other hot springs, to pump the hot water on the affected limb. By this *dry pumping*, as it is commonly called, the hot water is applied to the affected parts under a higher temperature than when it is drawn off into the reservoirs commonly employed for bathing.

Medical uses.

From the above account of the effects produced by the hot bath, it appears, that this remedy is a powerful stimulus, to be employed only in a few cases where the ordinary stimuli are ineffectual. Accordingly it is very seldom resorted to in medical practice, and almost the only cases in which the general hot bath is employed are those of confirmed and obstinate palsy.

Cautions.

In the use of the hot bath, considerable caution is required. The patient should begin with the lowest temperature of such a bath, or about 99°, and gradually increase the heat each successive bathing, according to its effects. The time of immersion should be short; and, on coming out of the bath, great care should be taken to avoid sudden exposure to cold. In some cases, attended with fulness of habit, it may be necessary to bleed or purge before attempting the hot bath.

Effects of the vapour bath.

Though the vapour or steam bath may be regarded as a modification of the hot bath, its effects are much less violent; and it has been employed with considerable success in cases where the hot bath would be attended with danger. It therefore requires our particular consideration.

History of bathing.

The most usual mode of employing the vapour bath is, as we have said, to expose the naked body in a room, into which the steam of hot water may be admitted. This room is generally heated to a temperature considerably above that of the atmosphere, and the body is for some time suffered to remain in this heated air; the common effect of which is to increase its temperature, and accelerate the circulation of the blood. After some time the steam is admitted, when the former symptoms are removed, and a profuse perspiration is produced. This is usually promoted by friction, and removal to a warm bed. The general effect of this process is, to relax the body, remove obstructions of the skin, alleviate pain and spasmodic contractions, and promote sleep.

In the vapour bath, the stimulant power of heat is modified and tempered by the moisture diffused through the air, and as the elastic vapour, like air, is [illegible] less powerful conductor or transmitter of heat than [illegible] watery fluid, the effect of vapour in raising the [illegible] perature of the body is much less than that of [illegible] hot bath. Its heating effect is also further diminished by the copious perspiration that ensues, so [illegible] on all accounts, the vapour bath is safer, and in [illegible] cases more effectual, than the hot water bath.

For the topical application of steam to the greatest advantage, the air-pump vapour bath was contrived by Mr Smith; and an account of the apparatus [illegible] its effects have been published by Dr Blegborough in a pamphlet to which we have already referred [illegible] His apparatus consists of a vessel of strong copper tinned on the inside, for inclosing the part to which the vapour is to be applied, and having attached [illegible] it a bladder, for the purpose of securing it, so as to be air-tight. To one end of the machine is fitted [illegible] pipe that communicates with a portable boiler, in which the water is heated by means of a spirit lamp. There is also a small air-pump for exhausting the machine, when the application is to be made in rarefied air, or after it has continued for a proper time. A thermometer is adjusted to the apparatus, for shewing the temperature of the included air.

This apparatus acts on the principle of removing the pressure of the atmosphere from the part affected, while moist and heated air or vapour is applied to it. Hence, it combines the actions of dry-cupping and fomentation, each of which is occasionally employed with advantage in several morbid affections.

The cases to which this vapour bath seems best adapted, are chiefly gout, both acute and atonic; acute rheumatism, palsy, several affections of the skin, as leprosy and ulcers, and white swelling of the joints. It is also recommended in female obstructions, chilblains, tetanus, and dropsy, and has proved highly efficacious in inflammations of the stomach and bowels. The usual mode of application is, to foment the part affected, by means of the steam admitted into the body of the machine, for a time proportioned to the nature of the case, commonly from half an hour to three quarters, and then to exhaust the machine by means of the air-pump, which generally occupies another quarter of an hour.

In the employment of the general vapour bath, it is evident that its first effects would be attended with opposite to, the *alveum*, or receptacle for the warm water. The sixth and last apartment, called *eleotherium* or *unctuarium*, seems to have formed a sort of closet for containing the oils or unguents with which the bathers were anointed. Below the building was a furnace called *hypocaust* or *suspensura*, for heating the several warm apartments, and probably the water employed in the warm bath.

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[*] The hot bath is described as increasing the perspiration; but this effect can take place on the *immersed* part of the body, only in the lowest degrees of the *hot* bath. The parts exposed to the air, indeed, will perspire, but the *general* perspiration can scarcely take place till after quitting the bath.

These structures were called *thermæ*, and were very numerous in the capital of the Roman empire. The construction of public baths appears to have commenced under Augustus, and to have been introduced by Mecænas his favourite. It was soon carried to an astonishing height; and the erection of baths, where the people might be accommodated *gratis*, became an established and successful method of gaining their affections. According to Fabricius, there were in Rome not fewer than 856 public baths, some of which were sufficiently large to contain at once 1800 persons. The most celebrated of these were the baths of Caracalla, Dioclesian, and Titus, the remains of which still exist, to testify the magnificence of their founders. *

Though we have denominated the *thermæ* of the Romans, *warm* baths, it appears from many passages in Seneca and Martial, that their temperature was so high as to entitle them to the appellation of hot baths, (Mart. *Epig*. lib. iii. 25.) The use of very hot baths had become excessive during the reigns of Adrian and Severus; but about the time of Galen they had fallen into disrepute.

Among the Arabians and Turks.

Bathing appears to have been an established custom, as an article both of diet and luxury, among the Asiatics at a very early period; but it became universal among the followers of Mahomet, after the promulgation of the Koran. The precepts on this head, like many others of the Arabian prophet, appear to have been borrowed from the law of Moses, and they were readily adopted from their congeniality with the manners and customs of his disciples. The Mahometans consider bathing as a necessary of life; and, besides the numerous public baths erected in their cities, and even villages, almost every family of distinction has bathing apartments within their own dwellings, for their private accommodation. These consist of two small chambers communicating with each other, and usually joined to the house by a small room in which the bathers undress. The passage between the two chambers is secured by double doors lined with felt, inclosing between them a space where the bathers may stop, before they enter either chamber from the other. The chambers are heated by a furnace below the innermost apartment; and over this furnace is placed a cauldron that is immediately under the marble floor of the apartment, and from which proceed several pipes through the walls of the chamber, some for conveying the heated water to the bath, and others communicating with the cupola that forms the roof of the apartment. Thus the room is heated on all sides; and the heat produced is so great, that the bathers are obliged to employ high wooden sandals to preserve their feet from the burning floor. Notwithstanding this great heat, and the profuse perspiration which it occasions, the women are accustomed to pass several hours in these private baths.

The public baths are on a similar construction, though on a larger scale, and the outer apartment is generally open at the top. In this the bathers undress, gird a napkin round their loins, and put on a pair of sandals; they then enter a narrow passage, heated to a moderate degree, and extending for about twenty paces between the outer apartment and the bath. This is a spacious vaulted apartment, with a small hall next the passage, having four closets round the centre. The floor is spread with mats or cloths, on which the bathers repose, with their heads supported by small cushions; and in this position they are subjected to the heated vapour, which rises on all sides of the bath. When this begins to excite perspiration, an attendant gently presses, and, as it were, kneads every part of the body with the knuckles, turning over the body, and making all the joints crack. After this operation, the skin is rubbed all over with a piece of coarse stuff, and the bather is then conducted into a closet, and is washed or laved with perfumed lather, which finishes the bathing. After bathing, it is customary to rub over certain parts of the body a particular paste or ointment, which acts as a depilatory, for depriving those parts of hair. Savary's *Travels*, vol. i. p. 146.

The Arabians or Moors, who conquered Spain and other parts of Europe, carried with them their predilection for warm bathing; and the Moorish antiquities still existing in those countries, exhibit some excellent models of artificial baths. In particular, the palace of Alhambra in Granada, contains a magnificent bason, which might be used either for cold or warm bathing, besides smaller apartments for odoriferous fumigations. See ALHAMBRA.

Few of the nations of modern Europe have practised warm bathing to any considerable extent, though among all of them the cold bath has been generally employed as a favourite and healthy exercise. In the west and north of Europe, warm bathing was scarcely practised prior to the 17th century, and the custom is only gradually advancing in France and England. Within the last thirty years, artificial baths, both for cold and warm bathing, have been constructed in various parts of this island. In no part of Europe, however, are warm and hot bathing so general as in Russia and Hungary. In Russia especially, all ranks employ the luxury of what is called the sweating bath, which nearly resembles the hot baths of the East.

Various accounts have been given of the Russian baths, but we believe none is more accurate than that of Dr Sanches, first physician to the late empress Catharine, inserted in the 25th volume of the *Journal de Physique*, with which we shall conclude this article.

The baths are erected as near as possible to a plentiful supply of water and wood, these being the most necessary articles for their consumption. When the ground is marked out, two parallel trenches are dug, and lined with brick, or stone, for the purpose of carrying off the waste water. Then the walls of the bath are raised. These must be built between the two trenches; the length of each wall being about 18 English feet, and the height 10 or 11 feet. A furnace is placed within the building, supplied with wood, vaulted like an oven, and lined with stones, that become red-hot by the fire within, and thoroughly heat the air. Two or three stages are placed round the room, one above the other, three or four feet distant from the furnace; and on these lie the bathers, to receive the heat of the stone. The floor of the bath forms an inclined plane, at the bottom of which is a small pipe, for carrying off through the trenches the water that has been used. Such is the construction of the public baths, from which those of private families differ only in having better accommodations, and a chamber for the bathers to repose after bathing.

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* For a particular account of the Roman baths, we may refer to Vitruvius, Seneca in his *Epistles*, and Pliny in his *Natural History*. An account of the Grecian baths is also furnished by Vitruvius, and by Lucian in his *Hippias*.

The baths are entered when the wood, with which the furnace is supplied, is nearly burnt to ashes; and the chimney is then closed, so as to render the heat of the room almost intolerable to those who are not accustomed to it. The bathers enter the room quite naked. In the private baths, some water is generally thrown upon the stones of the furnace before entering them; but, in the public baths, the common people expose themselves to the burning heat, lying on the stages where it is the most intense. The great heat at first often produces violent headache, and great thirst, to relieve which great draughts of cold water are sometimes taken, though (as Dr Sanches remarks) to the great injury of the constitution. When the room is sufficiently heated, and the warmth becomes troublesome, cold water is poured upon the hot flints around the furnace; this is instantly converted into vapour, and fills the whole room; and the water is renewed whenever the vapour begins to clear away. This excites in the bathers a most copious sweat, which they keep up by renewing the steam, and by friction of the whole body with the downy leaves of the lime tree rubbed with soap. The frictions being finished, the bathers cool themselves by pouring buckets of cold or tepid water over their bodies, or, what is more common, by plunging into a pond that is always near the bath, or, in winter, rolling in the snow. They then dress, and return to their respective occupations. The same general process is pursued in the private baths, except that there the bathers retire to the small room adjoining the bath, where they recline on beds till the sweating be over, and often sink into a profound sleep.

Cold bathing in the sea is also practised by the Russians; and the bathers here seem to pay very little regard to delicacy or decency. We are assured by Mr M'Gill, that, at the Russian ports on the Euxine, it is very common for males and females of all ages to bathe together in the open sea; and, deprived of all adventitious covering, to enjoy, with primitive simplicity, the pleasures of their favourite pastime. See M'Gill's *Travels in Turkey, &c.* vol. i.

On the subject of this article, see Floyer and Baynard on *Cold Bathing, and Hot and Cold Baths;* Marcard *Uber die Natur und den Gebrauch der Bader*, published at Hanover in 1793; or Parant's translation *De la Nature, et de l'Usage des Bains*, published at Paris in 1801; Duncan's *Medical Commentaries*, vol. xx.; Saunders' *Treatise on Mineral Waters*, chap. vi.; Currie's *Medical Reports on the Effects of Water*, 3d edit. vol. i.; and a *Treatise on Cold and Warm Bathing*, lately published at Edinburgh. See also Clarke's *Travels*, vol. i.; and Waring's *Tour to Sheeraz*. (*f*)

BATHS. See CIVIL ARCHITECTURE.

BATHURST, ALLEN, Earl Bathurst, was born in Westminster in the year 1684. His father was Sir Benjamin Bathurst of Pauler's Perry; and his mother was Frances, daughter of Sir Allen Apsley of Apsley. Having completed his grammatical education, he was entered, at 15 years of age, in Trinity college, Oxford, of which his uncle, the celebrated Dean Bathurst, was then president. Under the direction of this eminent scholar, he acquired that elegance of taste by which he was so much distinguished; and successfully applied his mind to those more solid attainments, which are requisite to form the character of a statesman. When he was only 21 years of age, he was called to the service of his country, as member for the borough of Cirencester, which he continued to represent in two successive parliaments. He distinguished himself by his spirit and eloquence in the debates respecting the union between England and Scotland, of which measure he was a firm supporter; and was also of great service to Harley and St John, in their opposition to the Duke of Marlborough. Amidst the numerous changes, however, which were made in the public offices, after the dissolution of the Whig ministry, he accepted no place under government; but, in the 10th year of Queen Anne's reign, when the administration brought 12 new lords into the Upper House in one day, he was created a peer, by the style and title of Lord Bathurst, Baron Bathurst of Battlesden.

Upon the accession of George I, when Lord Bathurst's political friends were in disgrace, his attachment remained unshaken; and he did not hesitate to lift his voice in opposition to the measures which were adopted against them, and which he regarded as most vindictive and severe. The first of his speeches mentioned in the common accounts of public transactions, was in Feb. 1717, on the bill for preventing mutiny and desertion; and, from that time, he took a distinguished part in every important measure, which came before the House of Lords. He was one of the most eminent leaders, in that House, of the opposition which was made to Sir Robert Walpole; and the general tenor of his political sentiments may be made apparent by the following short statement of the principal measures which he advocated or opposed. He strongly resisted the act for septennial parliaments in 1716, and was one of those, who entered their reasons of dissent from that bill. He was very favourable to the plans, which were proposed for relieving the scruples of the Quakers respecting oaths; and was a zealous advocate of Bishop Atterbury, in all the proceedings against that ingenious prelate. In Feb. 1730, he strenuously supported the bill, which prohibited pensioners from sitting in the House of Commons; and in May following moved an address to the king, praying for the discharge of the 12,000 Hes-

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Bathurst.

sian troops, then in the pay of Great Britain; though he afterwards, in 1743, vindicated the propriety of continuing the Hanoverian troops, on account of the peculiarly critical situation of affairs at that time. He opposed the bill for reviving the salt duty, as an undue taxation upon the poor; supported the Earl of Oxford's motion for reducing the standing army; and vindicated the utility of a national militia, as the most proper and constitutional defence in a free country. He constantly resisted all application of the sinking fund to any other purpose than the liquidation of the public debts. In the transactions which took place respecting the Spanish depredations, he bore an active part in arranging the conduct of those who were in power; and particularly exerted himself in the memorable debate upon an address to the king, for the removal of Sir Robert Walpole from his councils and presence for ever.

In 1740 Lord Bathurst was chosen a privy counsellor; and in 1757 was appointed treasurer to the Prince of Wales. Upon the accession of his present majesty in 1760, he was continued in the privy council; and, as he declined, on account of his advanced age, to accept of any public employment, he received a pension of £2000 per annum. He spent the remainder of his life in dignified retirement, employing himself chiefly in agricultural improvements, and other rural relaxations. The following extract from one of his letters to Dr Swift, furnishes a very pleasing picture both of his lordship's country occupations, and of his amiable disposition of mind:—"I have entered upon a new scheme of life, and am determined to look to my own affairs a little. I am now in a small farm-house in Derbyshire; and my chief business is to take care, that my agents do not impose upon my tenants. I am for letting them all good bargains, that my rents may be paid, as long as any rents can be paid; and when the time comes, that there is no money, they are honest fellows, and will bring me in what corn and cattle I shall want." He had married very early in life, Catherine, the daughter and heir of Sir Peter Apsley, his maternal uncle, by whom he had four sons and five daughters; and he lived to see his eldest surviving son several years lord high chancellor of Great Britain. He retained his activity and vivacity to the last; and died, after a few days illness, at his seat near Circencester, in the 91st year of his age, on the 16th of Sept. 1775.

Earl Bathurst was considered, even by his contemporaries, as one of the most consistent and disinterested public characters of the period in which he lived; and is represented, as having chosen his principles of government so happily from what was commendable in both parties, that, upon whatever side he spoke, he was never observed to lean to the extremes of either. His abilities and integrity gained him the esteem even of his political adversaries; nor was he, on the other hand, insensible to the merits of many of his opponents; but often treated them, when divested of their public offices, with so much delicacy and tenderness, as to secure their personal friendship and regard. He was distinguished in private life by humanity, politeness, and elegance of manners; and was always accessible, hospitable, and beneficent. He was intimately ac-
quainted with the most eminent litera
who adorned the beginning of the 18th
ny of whom were happy to cultivate
and proud to have the honour of his co
To Lord Bathurst Mr Pope address
Epistles on the use of riches; and the
from that poem may be given as a very
ry of his lordship's character, as well
able conclusion to this sketch of his lif

> The sense to value riches, with the ar
> T'enjoy them, and the virtue to impa
> Not meanly nor ambitiously pursu'd,
> Not sunk by sloth, nor rais'd by servi
> To balance fortune by a just expence,
> Join with œconomy magnificence;
> With splendour, charity: with plenty
> Oh! teach us, Bathurst! yet unspoil'
> That secret rare, between th' extreme
> Of mad good nature, and of mean self

BATIS, a genus of plants, of the
and order Triandria. See BOTANY.

BATNIANS, the inhabitants of a
north-east of Hindostan, bounded on
the Pendjab, and the river Setledge, a
by the district of Hurrianah, on the w
sert, and on the south by the Beykane
ritory of the Batnians is about 75 geog
wide from east to west, and 150 long
south. The cultivated part of the c
along the banks of the Cuggur, from
Batnir, the capital. The inundation o
by the streams with which they are t
sions an uncommon fertility in the soil,
to produce wheat, rice, and barley, in g
The higher parts of the country pro
which is common throughout India; b
districts, where they are deprived of wa
extremely barren.

Batnir, the capital of the district,
dence of its rajah, is about 200 m
Delhi, and 40 miles south of Batind
cities are Arroah, Futtahbad, Sirsah,
and these, with the numerous villages a
a population sufficient to furnish an a
men, without any injury to agricultu
years past, however, the emigration of
to the countries west of Auhd, has c
duced the population. Though the t
Batnians is separated from the countri
Indus by an extensive desert, about
length, they often venture in bodies acr
less waste, to invade the territories w
Furnished with all the implements of w
their camels loaded with bread, water, a
sions, which they deposit in different p
sert, they select guides, whose orders
obeyed during the journey, but who lose
rity as soon as they reach the frontier of
In this adventurous march the guides
selves by the sun during the day, and
star at night; and in cloudy weather,
these bodies to direct them, they freque
very spots where their provisions are dep

mes they lose their way, and return to the very om which they set out.

Batnians are remarkably cruel and ferocious. are robbers from their infancy; and even when eet with no resistance, they do not scruple to murunhappy victims whom they plunder. The imself participates in the booty of his subjects. ir expeditions to the territories of Sahib-Sing, ing, and Bang-Sing, celebrated chiefs among iks, they have generally been successful; and ave alternately laid waste the country of the chians, the district of Hurrianah, and the proof Beykaneer.

Batnian women are allowed to appear in pubeiled; and, excepting those of the chiefs, they mitted to remain in the company of the men, flocks they tend. The Batnians are Mahome- They smoke tobacco to a great degree; and their occupations they are never seen without uhka in their mouth. The Batnians import cloths, sugar, and cloth, and export horses, es, camels, and their superfluous rice. (Q)

TRACHOIDES, in Zoology, a genus of jufishes established by Lacépède to comprehend *dus tace* and *blennius raninus* of Linnæus. See YOLOGY. (*f*)

TRACHIA, (Fr. BATRACIENS,) in Zoolo- order of reptiles, established by the French nats, and adopted by Mr Macartney (Art. CLASTION in Rees' *Cyclopædia*,) to comprehend those which, like the *frogs*, have *a naked body, and two or four feet*. See HERPETOLOGY; and ril, *Traité Elementaire d'Histoire Naturelle*, . (*f*)

TTA, a country in Sumatra, whose inhabitants nthropophagists. Mr Marsden maintains, that attas eat human flesh as a kind of ceremony, to their detestation of some particular offences, and e practice was confined only to prisoners of war, persons condemned for crimes; but our ingecountryman, Dr Leyden, who visited Sumatra 5, gives a very different statement. "When a ecomes infirm," he observes, "and weary of orld, he is said to invite his own children to eat n the season when salt and limes are cheapest. en ascends a tree, round which his friends and ng assemble; and as they shake the tree, join neral dirge, the import of which is, "The seacome, the fruit is ripe and it must descend." ictim descends; and those that are nearest and t to him deprive him of life, and devour his rein a solemn banquet. The Battas of Sumatra ooks which consist of bamboos, or the branch ee, upon which they write with the point of a r. There are nineteen letters in the Batta al-, which is written from bottom to top, in a way ry reverse of the Chinese. See Marsden's *Ac- of Sumatra*; and Leyden *on the Languages and ture of the Indo-Chinese Nations*, in the *Asiatic ches*, vol. x. (*o*)

TTALION. See MILITARY TACTICS.

TTERING RAM. See RAM.

TTERY. See ELECTRICITY, FORTIFICATION, ALVANISM.

Battle.

BATTLE. In a military sense, a battle implies the encounter of two hostile armies, accompanied by mutual slaughter, and contending for some important object. The bad passions of men have ever been the cause of animosities and quarrels, which, among the individuals of civilized society, are generally decided according to certain laws established for the welfare of the community. But when differences arise among nations, there is no tribunal to appeal to, and the matter in dispute is often determined by force of arms. They collect a number of men together, whom they equip with the instruments of destruction, and hence form what are called armies. When these armies are brought in contact, and each endeavours to destroy the other, their efforts for that purpose, constitute what is denominated a battle.

In early times, a battle was a fierce tumultuary contest, the issue of which depended upon the physical strength of the combatants, because armies were then an assemblage of men, without order or discipline. But when arts and civilization had made some progress among mankind, the military system was improved, and battles were conducted with regularity, and subjected to certain rules, that taught men to destroy their species in a more dexterous manner than formerly, or, in other words, armies were trained to the art of war, which gave them a decided superiority over an undisciplined multitude. The formation, or mode of drawing up an army in the field of battle, is an important branch of military science, as a victory or a defeat may ensue from the proper or improper disposition of the troops. It is, therefore, the business of the commander to arrange the squadrons and battalions of his army in such a manner, as to join battle with the greatest possible advantage.

Battle of Thymbra.

The first battle, circumstantially recorded, is that of Thymbra, between the Persians and Lydians, with their respective allies, commanded by Cyrus and Crœsus. The army of the former consisted of 196,000 horse and foot, armed with cuirasses, bucklers, pikes, swords, bows, and slings, besides chariots with scythes, and moveable towers containing archers. Cyrus drew up his army in five lines, with the cavalry on the flanks. The heavy armed infantry were placed in the first line, twelve deep; in the second, the spearmen, light armed; in the third, the archers; in the fourth, troops similarly armed as the first line, intended to support the preceding lines, and as a corps-de-reserve; and in the fifth, the moveable towers. The armed chariots were divided into three small bodies, one of which was placed in front, and the other two were stationed on the flanks of the lines. Crœsus' army was twice as numerous as the Persian, and was drawn up in one line, 30 men in depth, with the exception of the Egyptian forces, which were stationed in the centre, and adhered to their accustomed order of battle. They were formed in square battalions, consisting of 10,000 men, with proper intervals between each battalion. The cavalry were stationed on the flanks of the line. When Crœsus observed that his front extended so far beyond that of the army of Cyrus, he halted the centre and advanced the flanks, that they might inclose the Persians. But Cyrus' cavalry and chariots briskly attacking them, they were dispersed. The Egyptian battalions, however, pressed forward, and drove the Persian lines up to their machines, but their flanks and rear being unprotected, they were exposed to the attacks of the victorious wings of the Persian army, and finally compelled to surrender, which terminated the battle.

The account of this battle is no where to be found, but in Xenophon's *Cyropædia*, which is a philosophical romance. But it probably bears the same relation to truth, that the incidents narrated in a modern work of that class bear to the real occurrences in life; and it may contain a faithful description of the Persian method of forming an army for battle in the age of Cyrus, with which Xenophon must have been well acquainted. We therefore discover, that by the Persian order of battle, the cavalry were placed on the flanks, and the infantry drawn up in lines, according to the nature of the weapons with which they were armed, and the efficacy that was to be expected from them in action. The first line consisting of heavy armed troops, using the short pike and scymitar; the second, light armed, with javelins, which they could project over the first line; the third, archers, where strong bows could throw the arrow over the two preceding lines; the fourth, heavy armed, intended as a corps-de-reserve; and, lastly, their machines and moveable towers, which answered nearly the same purpose as modern batteries.

The disposition of an army in lines is nearly all that the ancients of that and the previous ages knew of the military art regarding battles and engagements. They possessed little knowledge of the advantage of strong positions either for attack or defence; of annoying an enemy by cutting off his supplies, or of forcing him to battle under unfavourable circumstances; of securing their flanks by marshes, rivers, or mountains; or of seizing passes and defiles, by which a small army has been often enabled to resist a greatly superior force.

Battle of Marathon.

The art of war was brought to considerable perfection by the Greeks, whose battles in general were conducted with science and judgment. The Athenian army, in the battle of Marathon, was drawn up in such a manner as to embrace all the advantages of local situation, so as to afford a small body every possible chance of success against vastly superior numbers. Miltiades formed his little army at the foot of a mountain, which secured his rear, and by verging towards the sea, also protected his right flank; and on his left, there was a lake or morass. His flanks were farther protected, by the trunks and branches of trees strewed on the ground, through which the Persian cavalry could not penetrate. As the Athenian army consisted of only 10,000 men, Miltiades could not sufficiently extend his front, and at the same time preserve an equal deepness in his line; he therefore weakened his centre, and strengthened his wings, on which he placed his hopes of success. The enemy bent his principal force against the Athenian centre, which, notwithstanding the efforts of Aristides and Themistocles, was compelled to give ground. But the wings of the Athenian army having broke and dispersed those of the enemy, they attacked the main body of the Persians in flank and in rear, and
the Grecian spear overcoming all opposi
rout ensued, accompanied by an immense
the barbarians. The judicious disposi
Athenian army in this battle compensa
want of numbers; and being placed, fr
cumstance, on an equality with the Pe
rived all the advantages that could resu
perior discipline, skill, and valour.

The battle of Leuctra, which was f
120 years after that of Marathon, affords
tration of an able disposition in the field,
at the same time, the progress of militar
among the Greeks. The Lacedemonia
sisted of 24,000 foot and 16,000 hor
drawn up in the form of a crescent, with
in squadrons, in front of the right wing.
ban army was only 6000 foot and 400 ca
but it was commanded by Epaminondas.
ban general formed his left wing into a c
deep, composed of heavy armed troops,
valry posted in front, and the whole wa
the *Sacred Band* under Pelopidas. To g
being surrounded by the arms of the Spart
Epaminondas drew up the right wing of
a direction oblique to the Lacedemonian
verging from it, in proportion to the exte
ranks. The action commenced with the
cavalry, and the charge of the sacred b
occasioned considerable confusion in the
nian ranks. Epaminondas availed him
favourable opportunity, and rapidly form
lumn into a wedge, penetrated the right
enemy, and bore down every thing before
tory crowned his efforts; and to the able
of the Theban army we must attribute
On his massy column he placed all his ho
diciously protecting its flanks, where it wa
nerable, by the sacred band on the one ha
oblique line on the other, it was irresisti
oblique line kept the left wing of the enem
and his right was flanked and attacked by
band. Within a few years afterwards, the
Mantinæa was fought by the same genera
same principle, and attended by similar succ
discovery of the power of a deep battali
form of a wedge, belongs to the genius of
nondas, and it gave him a decided superior
his antagonists.

The battle of Chæronea was decided by th
of the Macedonian phalanx; and Philip se
place which he considered as well adapted for t
rations of that body, and altogether disposed
my with great judgment and sagacity. The s
of the Macedonian army was 30,000 foot and
horse. The Greeks were nearly as numerou
equal in courage and bravery. Philip com
the right wing, in which the phalanx was st
his son Alexander the left, with the Thessal
valry. The Athenian forces were opposed
Macedonian right, and the Thebans, with the
band, to the left. Both armies had their allie
centre. Alexander charged the Thebans, and
the sacred band to a man. The Athenians
their opposing divisions, and the Macedonia
gave way. Elated with their partial succe

heedlessly pursued the fugitives, and in the ardour of their impetuosity, neglected to charge the phalanx in flank, which was now unprotected, and where it was only vulnerable. Philip perceived their error, and wheeling the phalanx, rapidly gained an adjacent eminence, from which it poured down on the disordered Athenians with irresistible force, and determined the destinies of Greece.

The Grecian manner of disposing an army for battle, was, by drawing it up in one front, by which the success of the day depended upon a single effort. The infantry of the Greeks consisted of two kinds of soldiers. The one heavy armed, with bucklers, lances, pikes, and scymitars; and the other, light armed, with javelins, bows, and slings. They were particu-
arly deficient in cavalry, which is generally ascribed
o the mountainous nature of the districts of Greece,
here, indeed, that species of force was not so requi-
e as in a champaign country. The light troops
ere generally posted in front of the line of heavy
med infantry, for the purpose of skirmishing with
enemy; and when they had shot their arrows, and
charged their javelins, they retired through the in-
vals of the heavy armed troops, and forming a line
rear, continued their volleys during the action.
e Lacedemonian cavalry were always placed on
extremity of the left wing, a station which they
imed as an honour and a matter of right. Of all
Grecian nations, the Lacedemonians were the
st warlike, and their military system the most
fect. According to their establishment, their
ay was divided into battalions of four companies
h, consisting of 128 men, which were subdivided
four, or in divisions of four men in front and eight
depth, so that the battalion consisted of 512
diers.

The Macedonian phalanx, which produced such
onishing effects, as to be deemed almost invincible
several ages, was composed of 16,000 soldiers,
avy armed with a spear, a sword, and a shield. It
s commonly divided into ten battalions of 1600
ch, being 100 men in front and 16 in depth. But
is arrangement was occasionally altered, according
circumstances, and the battalion was sometimes
ght and at others 32 files deep. The spears of the
diers who composed the phalanx, were 14 cubits
length, and they generally received or charged an
my in close order. While the phalanx remained
broken, it could not be resisted by any less com-
t body, but it was assailable on the flanks and
r; and if vigorously attacked on these quarters,
unwieldy pikes were only an encumbrance to the
. The phalanx required flat and level ground, as
whole force depended upon the close order of its
s, which could not possibly be preserved on an
gular surface. It was only in particular situa-
ns, therefore, that it could act with effect, or pro-
e those decisive consequences, which followed
m its charge on the Athenians, at the battle of
eronea.

n the celebrated battle between the army of
rseus king of Macedon, and that of Paulus Æmi-
s the Roman consul, fought near Pyæna, the pha-
ax made dreadful slaughter among the Romans, and
as every where irresistible, while it kept in close order, but the unevenness of the ground occasioned intervals in the ranks, which the Roman general observing, caused his soldiers to penetrate at these openings, in small bodies, and make an attack on the phalanx in flank, by which it was totally overthrown. As the whole force of the phalanx consisted in the union of its parts, which gave it weight and solidity, it was easily destroyed when divided, and Paulus Æmilius thus obtained a signal victory.

Battle.

The Romans were the greatest masters of the art of war, of all the nations of antiquity; and finally prevailed over all their enemies, by their skill, bravery, and perseverance, as long as they maintained the laws and regulations connected with their military institutions. But they were occasionly worsted in battle, and the genius of Hannibal for a time eclipsed their glory.

The Roman army was usually drawn up in three lines, which were several files deep, and the legions generally possessed the centre. The right and left wings were composed of the allies, or auxiliaries, and the cavalry were sometimes stationed behind the foot, that they might pass through the intervals between the divisions and suddenly fall upon the enemy. This form of arranging the army, however, was not invariably adhered to, for sometimes the different kinds of troops were placed in the same line. For example, when there were two legions, the one with its allies was stationed in the first line, and the other behind as a body of reserve. The Romans usually engaged with a straight front; but occasionally they varied the line of battle by advancing or withdrawing particular parts. The wings were sometimes advanced before the centre, or the reverse; and they sometimes formed themselves into the figure of a *wedge*, or into the shape of a *forceps*. But when surrounded by an enemy, they formed the *orbis*, or circular body; and when they advanced or retreated in separate divisions, the *serra*.

The *velites*, or light troops, began the battle; and when repulsed, retreated between the intervals of the files, or, by the flanks of the army, and rallied in the rear. The *hastati* then advanced, and if defeated, retired into the intervals of the ranks of the *principes*, or, if greatly fatigued, behind them. The *principes* then engaged, and if defeated also, the *triarii* then received the enemy with their ranks closed and strengthened by the *hastati* and *principes*. By this arrangement of the Roman army, the enemy had to sustain and to repulse various attacks before they could totally overcome it, and obtain a victory.

Battle of Cannæ.

The long and destructive contest between Rome and Carthage, gave occasion to some of the most fierce and obstinate battles of antiquity, in which the valour of the troops and skill of the generals were eminently displayed. In the battle of Cannæ, the tactics of the contending parties, and of the age, are exhibited in the manœuvres and disposition of the two armies in the field. Hannibal had previously defeated the Romans in the battles of Trebia and Thrasymene; but they collected a numerous army to oppose him, which was commanded by the two consuls Paulus Æmilius and Varro. The Romans, including their allies, amounted to fourscore thousand foot, and about six thousand horse. The Carthaginian army consisted of forty thousand foot, and ten thousand cavalry. The whole infantry of the Roman army were in one line, closer and deeper than usual; the cavalry upon the two wings; and the light armed troops advanced in front at some distance from the main body. Paulus Æmilius commanded the right wing, Varro the left, and Servilius Geminus the centre of the army. Hannibal also drew up his army in one line of equal depth, with the Spanish and Gaulish cavalry on the left, and the Numidian horse on the right. The light armed troops were stationed in front facing those of the Romans. Hanno commanded the right wing, Asdrubal the left, and Hannibal the centre of the army, which was composed of the Spanish and Gaulish legionaries, and advanced forward in such a manner, as that the whole line formed the figure of a crescent, with the convex side towards the Romans. The light armed troops commenced the battle, and the horse of the left wing of the Carthaginian army so furiously charged those of the Roman right, that they gave way and were totally dispersed. The infantry of the Carthaginian centre were unable to withstand the superior numbers of the Romans, and gave ground. Hannibal had calculated upon this circumstance, and was accordingly prepared to receive the eager Romans by a second line of battalions, which he had drawn from the wings, and were ranged in close order. The front of the Carthaginian army now became a crescent with the concave side towards the enemy, who impetuously pressed forward, exposed both his flanks to the assaults of the Carthaginian wings, and being at the same time attacked in rear by the victorious Asdrubal, who had also dispersed the cavalry of the left wing, the Romans were thus encompassed on all sides, and so much compressed, that they had not room to wield their arms, and were put to the sword, to the number of seventy thousand.

Hannibal's disposition of his army in the battle of Cannæ, has been admired by the tacticians of all succeeding ages. But it is evident, that the success of the horse of his left wing gave him a decided superiority over the Romans, whose only error arose from too keenly pursuing the Carthaginian centre, while their flanks were unprotected, in consequence of the dispersion of their cavalry.

Battle of Pharsalia.

In the celebrated battle of Pharsalia, the defeat of Pompey's horse gave the victory to Cæsar. Pompey drew up his army with the veteran soldiers in the centre and on the flanks; and the less expert between the wings and the main body; with the whole of his cavalry on the left flank, the right being protected by the river Enipeus. When Cæsar observed that his great antagonist had drawn all his cavalry to one point, he conjectured that Pompey intended to turn his right flank, to prevent which, he stationed six cohorts, as a separate body, behind the right wing. Pompey's horse compelled Cæsar's to give ground; but when they extended themselves with the view of flanking Cæsar's left wing, the cohorts vigorously attacked, broke, and dispersed them, and then fell upon the rear of Pompey's left wing. Cæsar in the mean time brought up his third line, which till then had not engaged, and Pompey's infantry being thus assailed on all sides, could no longer resist, but fled to their camp. Cæsar owed his success, in a great measure in this battle, to the able disposition of his army, especially in forming the cohorts as a corps-de-reserve, which repulsed the enemy's cavalry, turned his right flank, and attacked his legions in the rear.

The Roman manner of drawing up an army for battle may be sufficiently illustrated by the instance of a single legion. The cavalry were stationed on the wings, and the infantry formed on a line with the first cohort; the second cohort drew up on the left of the first; the third occupied the centre; the fourth was next; and the fifth closed the left flank. In the second line, the sixth cohort drew up behind the first on the right flank, the seventh next, the eighth in the centre, the ninth was next, and the tenth always closed the left wing. In the rear of these two lines were the light infantry, armed with shields, javelins, swords, and missive weapons, and here also the archers and slingers were posted. In the rear of these three lines the triarii were stationed. They were armed with shields, cuirasses, helmets, greaves, swords, and daggers, loaded javelins, and two missive weapons. They rested on one knee during the action, that in the event of the preceding lines being defeated they might be fresh when brought up to the charge. In the beginning of the conflict, the first, second, and fourth lines, remained immoveable, and the light armed troops advanced in front of the line and attacked the enemy. If they were successful they pursued him; but if they were repulsed, they retired behind the heavy armed infantry, which now sustained the action, at first, with their missive weapons, and then, sword in hand. If the enemy fled, he was pursued by the light armed troops and cavalry; but if the contrary happened, and the legion was worsted, it endeavoured to preserve its order in the retreat. A Roman legion was an army complete in all its parts, and contained every thing requisite for war within itself. A free space for his arms and motions was allowed to the soldier, and by the intervals the exhausted ranks could be easily supplied with reinforcements. The Greeks and Macedonians formed their system of tactics on very different principles; for the strength of the phalanx depended upon sixteen ranks of long pikes wedged together in the closest array. "But it was soon discovered," says Gibbon, "by reflection as well as by the event, that the strength of the phalanx was unable to contend with the activity of the legion."

The people of antiquity were extremely addicted to superstitious rites, which preceded every great undertaking; and war, the most momentous business of mankind, called forth all their prejudices in favour of divination and sacrifices. Oracles and augurs were consulted, and lucky or unlucky days were considered, previous to entering into a war, or engaging in battle. This custom of soliciting the assistance of the gods, universally prevailed amongst the Egyptian, Assyrian, Grecian, and Roman nations. The Lacedemonians had no share in the glorious battle of Marathon, because, by a ridiculous superstition, they were prevented from marching before the day of full moon. But so much were that people under the influence of divination, that, at the battle of Platæa

emained in their ranks while the Per-
l them, because their offer of sacrifice
:o be acceptable to the gods. Pausa-
rtan general, by the fervency of his
ned at last the favour of heaven; and
appearing propitious, gave the signal
en his army fell upon the Persians with
n that they were totally defeated.

for battle among the Greeks were of
her visible or auricular. The most an-
hted torches, thrown from both armies
of Mars, whose persons were held in-
e elevation of their ensigns, or flags,
mantle raised upon the top of a spear,
nals for battle. But these being laid
nd of the shell and the trumpet indica-
of the general, and animated the souls
The Greeks then rushed into battle
hout, to encourage themselves, and inti-
nemies.

he Romans, signals were distinguished
—vocal, semivocal, and mute. Vocal
he words given for the engagement by
semivocal, by the sound of the trumpet,
ccina, which directed the army whether
ance, to pursue the enemy or to retreat.
, were the eagles, dragons, standards,
e soldiers followed wherever they mo-
roops were accustomed to understand
ll these signals, whether in their quar-
rches, in camps, or in battles. It was
ry for bodies of troops, at a distance
ier, to convey intelligence by fires in the
smoke in the day.

ing battle, it was the practice of the
ldress their armies; and the pages of the
ians are full of these harangues. They
l to the occasion, and calculated to im-
liers with the justice of their cause, or
eir hatred to the enemy. By such ora-
ere often animated with new life and
d sometimes retrieved their affairs, when
consequence of a seasonable appeal to
and patriotism. The great generals of
e too well acquainted with the effect of
ies to omit them on any important oc-
they were followed by a shout from the
ch still further stimulated their courage.
g the army, war cries, and shouts, were
ll nations; and Tacitus has preserved
Galgacus to our barbarous forefathers,
engaged Agricola's army in the battle
pians. In latter ages, the feudal chief-
land also observed this custom, and each
peculiar *war-song*, called *sluggan*, *slog-
orn*, which are corruptions of the Gaelic
AN, i. e. *the war-song*. These *sluagh-*
ometimes composed of a few words, and
re of considerable length. Of the first
ch-ard, (*i. e.* the *high hill*,) which was
of the Mackenzies; Lochow, (*i. e.* the
loch,) the *war-cry* of the Campbells;
latter kind is the speech of Galgacus,
ave been repeated to the Romans by the
Caledonian bards, who were the composers of such pieces, and therefore not altogether a fiction of the historians, as generally imagined.

The invention of gunpowder introduced a new era in the annals of war; and, from the difference of the armour of the ancients and moderns, a difference in the disposition of an army in battle necessarily resulted. The power of artillery, and even of small arms, rendered the phalanx, or deep column, totally useless, as the physical strength of men is of no avail against a ball projected by the force of gunpowder. Although the nature of the weapons now employed require a disposition in battle different from that of the most skilful captains of antiquity, yet the same principle that guided the tactics of Epaminondas and Philip has been successfully adopted by some of the most celebrated generals of modern times. To render the assault irresistible in one point, that the confusion produced there might be communicated to the whole line, was the object of the Theban hero, when he led his column in the shape of a wedge to attack the Lacedemonians; and the phalanx of Philip of Macedon, in the battle of Chæronea, from the same cause, produced similar consequences.

Battles of Frederick the Great.

Frederick of Prussia imitated and improved the tactics of these great men, and reduced their science to a practical application that corresponded with modern weapons. The attack in flank, which had been considered as only incidental, became the principal action in his battles; and to form unforeseen and skilful dispositions in the moment of onset, or during the engagement, constituted his system in the field: the principle of which is, that a greater front can be brought to act against a smaller; and thus an army, inferior in number, may surpass the enemy in exertion on these particular points, where the attack is likely to prove decisive.

Frederick's judicious disposition of his battalions, and his seizing the critical moment to attack the enemy in flank, decided the battle of Craslau; and by similar manœuvres, he defeated the Austrians in the battle of Hohenfriedberg. In the battle of Sohr, the success of his cavalry enabled the Prussian infantry to carry the Austrian batteries, and to turn and attack the flank of their army, which decided the victory. In the battle of Rosbach he displayed the same manœuvres, and the same promptitude of action. The enemy's army was composed of battalions arranged alternately in column and in line; but his right flank was unsupported; and Frederick, adopting Cæsar's plan at the battle of Pharsalia, traversed his left wing with two battalions. The enemy advancing to the attack, these battalions wheeled half a circle to the right, which threw them on his flank. The French, being galled by the fire of the Prussians, pressed towards the left, which made the columns and battalions a heavy and compressed line, that was exposed to the discharges of the whole Prussian front. By this judicious disposition of Frederick's battle, a handful of men overcame a great army. In the decisive battle of Leuthen, the disposition and manœuvres of the Prussians were exactly similar to those of the Thebans in the battle of Leuctra. Their right wing threatened to turn and at-

attack the enemy's left, while the rest of their line formed in an oblique direction, gradually diverging as it extended. The Prussian right wing accordingly attacked and repelled the Austrian left, and, seizing an eminence which it had occupied, planted a battery of cannon, that decided the fate of the day. In this battle the Austrians were 60,000 strong, and the Prussians no more than 30,000; but still the science and able disposition of Frederick reduced the superior number of the enemy to nothing, and gave him a most important victory.

The motives that may induce an experienced general to hazard a battle arise from various considerations. The consequences that may result from it, when decisive, are so important and momentous, that nothing but the fullest confidence of success, on the one hand, or imperious necessity on the other, could induce a man of reflection to venture so great a stake, especially as he must be aware that the issue depends upon so many contingencies. The greatest captains of all ages have occasionally committed errors, and miscalculated the extent of their own powers, as well as those of the enemy; but in many instances, a trivial circumstance, unexpectedly occurring, has decided a battle, contrary to all expectation. The discipline and spirit of the troops, conjoined to a confidence in the skill of their commander, are great means of ensuring success; and the expectation of victory often stimulates to extraordinary exertions.

There are certain common rules which ought to be observed by every general before he engages in battle. He ought to know the nature of the enemy's ground as well as his own; the strong or weak positions which it presents; and by what local advantages his own flanks can be supported, or those of the enemy attacked; and also to be acquainted with the weak points of his own and antagonist's disposition, that he may be prepared to strengthen the one, or to annoy the other. For the purpose of supporting or attacking weak points, a *corps-de-reserve* is generally stationed in rear, and the exertions of that body have sometimes produced the most important consequences. The reserve under Dessaix decided the battle of Marengo in favour of the French, by charging the Austrian centre, which had been too much weakened.

A genius for war is a peculiar gift which few men possess; and although it may be improved by study and experience, yet no man can ever be a great general unless he be naturally active, and at the same time cool and considerate, but above all, endowed with a quickness of perception, that enables him instantly to discover every contingency that may arise amidst the bloody scene of a battle. He must be capable of opposing the sudden movements of the enemy, by new schemes instantaneously adopted, and readily executed; as it is by a general's address that he can take advantage of circumstances, and may sometimes make a motion conducive to the whole success of the battle.

The order and disposition of the troops depend entirely upon the commander, whose duty it is to give them every possible advantage; but the faithful execution of his orders depend upon his general officers, who ought to have as much knowledge of the business of the day, as to be able to vary then
to circumstances, when in such situations
commander himself cannot direct their
The multiplicity of intricate movement
necessarily occur in battle, and which ar
with many unforeseen circumstances, p
possibility of previously arranging all t
parts of an army, so as not to require, du
the constant watchfulness of those who
and he is the best general who is able to
every varying incident that may be prese
in such a scene of bloodshed, uproar, an
See Rollin's *Ancient History*, vol. ii.
132, 244, 245; vol. iii. p. 95, 99; vol.
311, 410; vol. v. p. 251; vol. vi. p.
p. 79. Gillies' *History of Greece*, vol
398; vol. iii. p. 257, 368; vol. iv. p. 208,
lin's *Roman History*, vol. v. p. 60, 61; vo
Polybius, book iii. Adams' *Roman An*
379, 382, 383. *Vegetius*, book ii. and ii
Antiq. vol. ii. p. 76—79. Gillies' *View*
of Frederick of Prussia, p. 12, 116, 162
(T)

BATTLE, or BATTEL, a small town i
ty of Sussex, which received its present
William the Conqueror, after the decisi
which he gained at Hastings, when he fo
magnificent abbey which still adorns this tow
is remarkable only for the peculiar exce
its gunpowder, which is esteemed the best i
and is known by the name of "Battle p
Count Rumford found, that the best powd
in this place is stronger than government po
the ratio of 4 to 3, but that it is $41\frac{2}{3}$ *per cent*
than it ought to be. Number of houses i
291; population 2040, of whom 230 were r
as employed in trade and manufactures. (*j*)

BATTUECAS, the name of two uncil
vallies in the bishoprick of Soria, in the king
Leon, eight leagues from Castel Rodrigo, and
teen from Salamanca. These vallies are sca
league in length, and are so completely enc
among lofty and rugged mountains, that, in
the sun is only seen four hours a day. Gro
rocks curiously shaped, excavations in the mo
and a great variety of trees and animals, are
the curiosities of the Battuecas. A convent o
footed Carmelites, established here in 1559,
ried among the trees of the impending rocks
only habitation of importance. It was long
ceived opinion, that these vallies were complet
known to the Spaniards, and that they were
vered during the last century by two lovers,
fled in search of an asylum from the venge
their parents. This notion, however, has bee
pletely refuted by Father Feyjov, and also by
Sanchez, who, in the year 1659, published,
drid, a work entitled *Verdadera Relacion y m*
Apologetico de la Antiguedad di las Battuecas
Bourgoing's *Travels in Spain*, chap. xxiv.;
borde's *View of Spain*, vol. iii. p. 353. (q)

BAVARIA, one of the circles of Germ
bounded on the north by Franconia and Bo
on the east and south by the circle of Austri
on the west by Swabia. The whole extent

has been estimated at one thousand and twenty leagues. The states which it contains, a- ting to the number of twenty, are divided into enches, ecclesiastical and secular. The first of benches consists of the archbishopric of Salz- the bishoprics of Ratisbon, Passau, and Frey- , the princely provostship of Bercktoldsga- nd the abbeys of Saint Emeran, Nieder, and Munster, in the town of Ratisbon. The secu- ch is composed of the electorate of Bavaria, chies of Neuburg and Salzburg, the landgra- f Leuchtenberg, the princely county of Stein- the counties of Haag and of Ortenburg, the ips of Ehrenfels, Sulzburg, Pyrbaum, Hohen- k, and Breiteneck, and the imperial town of on. The Elector of Bavaria and the Arch- of Salzburg possess the joint power of convo- the states of this circle; and their assemblies, hich those princes alternately preside, are ge- held at Ratisbon, or at Wysserburg. This furnishes only one assessor to the imperial er, though, by the treaty of Westphalia, it to send four.

far the greater part of this circle belongs to ector (now king) of Bavaria, who is one of the powerful of the secondary princes of Germany. e the late wars between Germany and France, minions in this circle consisted, 1st, Of the y of Bavaria; 2d, Of the Upper Palatinate, or alatinate of Bavaria; 3d, Of the principalities wburg and Sulzbach; 4th, Of the Landgravi- r principality of Leuchtenberg; 5th, Of the y of Haag; 6th, of the lordships of Ehrenfels, urg, Pyrbaum, Breiteneck, and Hohenwaldeck. es these territories, he was sovereign lord of the er part of the county of Erbach, in the circle of onia; in the circle of Swabia, he possessed the ips of Wiesensteig, Meindelheim, and Schwa- ; in the circle of the Lower Rhine, the Lower nate, or the Palatinate of the Rhine; in the of the Upper Rhine, the principalities of Sim- Lautern, and Veldenz, with two-thirds of the y of Spenheim, besides the reversion of the prin- ty of the Deux Ponts, another part of the coun- Spenheim, and half the bailliage of Hombourg, her half of which belonged to the house of Nas- aarbruck; in the circle of Westphalia, the ies of Juliers, and of Berg. The connection recently took place between the families of the or and the Emperor of the French, induced Na- to erect the electorate into a kingdom, which, *ordonnance* of the 21st June 1808, has been d into fifteen circles, whose names, extent, and ation, are accurately laid down in the following :

Names.	Extent in Sq. Miles.	Population.
he circle of the Mein,	72¼	190,650
......of Pegniz,	42	141,900
......of the Nab,	130¼	220,835
......of Retzal,	67¾	190,077
......of the Altmuhl,	94¼	202,107
......of the Upper Danube,	79	258,589
......of the Lech,	91	223,176
......of the Regen,	121	237,095
9. The circle of the Lower Danube,	118	215,661
10. ....of the Isar,	155¾	302,530
11. ....of Sulzbach,	103½	190,967
12. ....of the Iller,	118	237,097
13. ....of the Inn,	176¼	202,751
14. ....of the Eisak,	154¾	191,611
15. ....of the Adige,	112¼	226,492
Total	1636	3,231,538

The kingdom of Bavaria, which belongs to the confederation of the Rhine, has an annual revenue of 20,000,000 florins, and can bring into the field an army of 65,000 men.

At present we shall direct the attention of our readers chiefly to the DUCHY of BAVARIA. It is bounded by Tyrol and the archbishopric of Salzburg on the south; by Swabia and Franconia on the west; on the north by the Upper Palatinate; and on the east by Bohemia and Austria. Its extent is generally estimated at 576 miles, or 1600 square leagues; and the number of its inhabitants, according to the most accurate computations, amounts to about 900,000. The Duchy of Bavaria holds the fourth rank among the German states; assigning the first rank to the house of Austria, the second to the house of Brandenburg, and the third to Saxony. Under even tolerable culture, it might very easily maintain more than double of its present population; and, with the advantage of a better government, might develope a power at least four times greater than it can at present boast. It is divided into Upper and Lower Bavaria, the former of which is the extremity of the immense chain of the Alps, which stretches into this country through Salzburg and the county of Tyrol. The Duchy, including the Palatinate, is said to contain 34 towns, and 80 burghs, 8000 villages or hamlets, and thirty-six thousand estates, subject to taxation. It has 3050 churches, 548 chapels, 908 cures, 12 chapters, and 142 convents, 3765 secular clergy, and 3560 religious of both sexes. Its chief towns are Munich, Straubing, Landshut, Donawert, and Burghausen.

Aspect of the country, soil, &c.

The southern parts of Bavaria, though very mountainous, are by no means so unfit for agriculture as they have been generally represented. Amidst those rugged and stupendous mountains, which excite ideas only of grandeur and sterility, the eye is frequently relieved by beautiful vallies, the soil of which is so rich as to repay, more than six-fold, even the awkward and unskilful culture of a Bavarian farmer. The tract of country which stretches from Munich along the banks of the Danube and the Inn, is the finest arable land in Bavaria; and is beautifully diversified with hills, which are clothed to the summits with magnificent forests. The Upper Palatinate, with that part of the Duchy of Bavaria which lies on the farther side of the Danube, is a continued chain of mountains, which ascend gradually from the Danube to Mount Fichtelberg, and the mountains of Bohemia; yet these lands afford excellent pasturage, and are, in many places, susceptible of any kind of culture. Of this country, so highly favoured by nature, a great proportion is allowed to remain altogether uncultivated. There are vast tracts of land which the indolent inhabitants condemn as marshes, but in many of which the traces of ancient furrows still remain to reproach their negligence and inactivity. There is another part of Bavaria covered with a fine forest; while a third part, without any apparent necessity, is always left in fallow. Upon the whole, it is probable, that not more than one half of the country is under proper cultivation.

State of agriculture.

There is scarcely a place in Europe where agriculture is in such a backward state as in Bavaria, or where the natural advantages of the country are so little understood and improved. Schloetzer (in his *Correspondance sur l'Agriculture de la Baviere*) informs us, that agriculture is so much neglected in Bavaria, that, except in good years, it does not produce enough of grain for the consumption of the inhabitants. A country, placed under the same latitude with Austria, might be expected to produce wine; but Bavaria has none. Whatever wine is used there, is purchased from the neighbouring states; and the people, unlike the other southern nations of Germany, make beer their principal beverage. Another fact yet more astonishing, and which seems to indicate a very low degree of barbarism, is, that very few fruits are cultivated in this country. The neighbourhood of Munich is almost the only place where an orchard is to be found; and even there the supply of fruit is altogether inadequate to the demand of the city. Thus while, throughout the whole of Germany even to the Baltic and the German Ocean, there is not a village where every peasant has not a well-stocked orchard,—in the south of Germany, where that species of culture would be much easier and more productive, a large country is found where the art of gardening is almost unknown. Even the rearing of vegetables is neglected: white coleworts, of which they make sour crout and salad, is the only vegetable with which the Bavarian peasantry are acquainted; and although they brew an immense quantity of beer, they are obliged to import hops from other countries. In a word, they are unacquainted with every kind of industry, except that rude agriculture which has been transmitted to them from their ancestors.

Causes of the backward state of agriculture in Bavaria.

The wretched state of agriculture in this country is, in a great measure, to be ascribed to the ignorance of the secular and ecclesiastical proprietors, and to the foolish administration of the officers of government. Nothing can be conceived more unfavourable to improvement than the manner in which the lands of Bavaria are farmed. The farmers are divided into four classes —The first class, who are called farmers by way of eminence, must have at least 8 work horses, and are surnamed *einsiedler*, or *hermits*, because their farms are always at some distance from any town or village. Many of these farmers have an extent of about 3 miles square, and employ from 12 to 15 plough horses: of this class there are about 40,000; the second class, called half farmers, consists of those who have only four horses; the third, called quarter farmers, of those who have only two; and the fourth class, called *haussler*, are merely day labourers, who work for the other classes, and have no horses of their own. The disparity in the condition of these different classes is attended with this deplorable evil, that it often gives to the rich farmer an opportunity of oppressing and ruining his poorer, though equally industrious, neighbour. The husbandman who has no capital, depends on his annual harvests for the supply of his immediate necessities. He is of course obliged to carry his own grain to the readiest market, and to sell it at the lowest price. The opulent farmer, on the contrary, can keep his barns filled, till an opportunity occur of selling dear; he keeps up the corn, which the less wealthy agriculturist is unable to retain, and often advances to him the whole value of his ensuing harvest. One unfavourable year involves the poor man in difficulties, and throws him entirely dependant on his rich competitor, who seizes without compassion on his property, and thus acquires new opportunities of enriching himself, and of heightening, by a dangerous monopoly, the price of provisions to the public.

This evil is still greatly increased by the injudicious mode of taxation which is followed in Bavaria. No exemption is made in favour of the poorer classes of labourers, who are taxed, as far as their slender means extend, at the very same rate as the wealthiest of their countrymen. The veneration paid to the monks, and the prodigious number of convents established in this ill-regulated country, is another circumstance which tends greatly to retard the progress of agricultural improvement. An income exceeding one-third of the revenue of government is engrossed by these ecclesiastics, with a complete immunity from all taxation. They do more serious injury to the community, however, by persuading the richer farmers to send their sons into convents, with each of whom they receive a sum of 3000 or 4000 florins. The country, thus deprived of those who would be best able to improve it, remains only half cultivated; while the children of the other farmers, by being likewise educated in convents, are rendered totally unfit for any serious profession, or regular industry.

In a country where agriculture is so little understood, neither manufactures nor commerce can be expected to flourish. Even the manufacture of woollen cloth, which, in such a climate as that of Bavaria, is one of the most necessary articles of dress, is almost entirely neglected. More than a century ago 7000 pieces of cloth were annually fabricated in this country, whereas, at present, it can scarcely produce 5000. Westensieder, in his description of Munich, gives an enumeration of the different tradesmen and artists there, which exhibits a very curious view of the preposterous and unnatural state of manufactures and the arts in that capital. It contains eight engravers, six chocolate makers, sixteen goldsmiths, seventeen varnishers, six bakers of gingerbread, twenty-four painters of the *corps de maîtrise*, seventeen hairdressers; but only two basket-makers, two cloth-painters, not a single weaver, six curriers, fifteen clothiers, seventeen spinners and carders of wool, and four persons who work in cotton stuffs. There is besides a manufactory of tapestry *en haute lisse*, and another in gold and silver lace; they have been anxious to establish manufactures of silk, and to rear plantations of mulberry trees, while the native productions of the country are neglected, and the use of them discouraged.

empire by Charles I., he reserved only the lands of Luneburg, Brunswick, and Nordheim.

Otto, the eldest son of the house of Wittelsbach, and lineally descended from duke Arnold, obtained the duchy of Bavaria, which was now separated from the Tyrol. His son and successor Louis was created Count Palatine of the Rhine by king Frederic II., and the possession of that palatinate descended to Otto the son of Louis. Louis the Severe, and Henry, the sons of Otto, divided between them their paternal domains. Louis kept possession of the palatinate of the Rhine and Upper Bavaria; the remaining territories fell to the share of Henry. A new division was made by Louis and Rhodolphus, the sons of Louis the Severe. Rhodolphus was the founder of the house of the Electorate Palatine; and Louis of that of the Electorate of Bavaria, which continued to reign till a very recent period. Louis being elected emperor, made a treaty with his nephews, the successors of Rhodolphus, by which he formally ceded to them the palatinate of the Rhine, with the Upper Palatinate, which then for the first time received that name. The sons of Etien having made a division of Bavaria in the year 1392, formed the branches of Ingolstadt, Landshut, and Munich, the first of which branches was extinguished in 1447, and the second in 1503. Maximilian I. being invested with the electoral dignity in 1623, and with the title of Upper Palatine in 1628, obtained the confirmation of both by the treaty of Westphalia. His grandson Maximilian II. was put under the ban of the empire, but recovered possession of his dominions in 1714. Charles Albert, the son and successor of Maximilian II., being raised to the imperial throne in 1742, waged an unsuccessful war against Austria. His son Maximilian Joseph died without issue in 1777, and thus the branch of the electoral house of Bavaria became extinct; the eighth electorate, created in favour of the Counts Palatine of the Rhine, was suppressed, and these counts resumed their ancient rank in the electoral college, with all the prerogatives which are attached to it.

Immediately after the death of Maximilian Joseph, the Elector Palatine took possession of Bavaria, and the house of Austria seized upon part of the electorate. Against this usurpation the king of Prussia made a formal appeal, and hostile preparations were immediately set on foot by both powers. The emperor levied three powerful armies, the first of which, consisting of 80,000 men, he proposed to send into Bohemia under the command of the archduke Maximilian, and general Nadasti; the second was to be commanded by the emperor in person, and by generals Lasci, Haddik, and Laudon in Silesia; and a third was to be entrusted to the command of duke Albert, and general Strowitz. The imperial army had already advanced towards the frontiers of Bohemia, when the will of the late elector of Bavaria was opened at Ratisbon. It constituted the elector Palatine universal heir, and comprehended in the inheritance the allodial estates of the late duke Clement, with the burden of maintaining constantly in Bavaria an army of 12,000 men, agreeably to the treaties of 1763, 1771, and 1774. While the elector Palatine, who had acceded to the usurpation of the emperor, was yet hesitating what part he should now take, the king of Prussia took the field, passed the frontiers of Bohemia, and encamped within view of the imperial army. Some skirmishes ensued, and all Europe was looking forward with anxiety to the event of a general engagement, when the two sovereigns, willing to spare the blood of their troops, entered into a negociation. Next year the house of Austria declared itself willing to renounce part of its pretensions, and to sign an accommodation; Prussia was satisfied, and all thoughts of war were for the time relinquished. The future history of Bavaria will come more properly under that of Germany, with which it is closely, and indeed inseparably, interwoven. We may only observe, that the jealousy which has long subsisted between the houses of Bavaria and Austria induced the former to remain neuter in the late war between Germany and France. This circumstance naturally conciliated to Bavaria the favour of the French; and when Austria peremptorily demanded an army from the elector, Bonaparte took him under his protection, adopted him as an ally, and at length conferred upon him the dignity of royalty.

The elector of Bavaria held the fifth rank in the electoral college, and the second among the secular electors. As duke of Bavaria, he ranked first in the college of the princes of the empire, and had the privilege of first delivering his opinion. The house of Bavaria had likewise been from a very remote period in the hereditary possession of the office of arch-seneschal of the empire. By the act of division passed between Louis, duke of Bavaria, and his nephews, in the year 1329, it was agreed that the dignity of arch-seneschal should be common to the houses of Bavaria and Palatine, but that the right of voting in the electoral college should belong to them alternately. The Palatine house being privately invested by the golden bull with the dignity of elector, afterwards appropriated to itself the office of arch-seneschal. But when the elector Palatine Frederic was put under the ban of the empire in 1623, both of these dignities reverted to the duke of Bavaria. The first was confirmed to him by the treaty of Westphalia, but the latter was not mentioned, and was enjoyed by the elector Palatine from 1706 to 1714. The vicariat of the empire on the Rhine, in Swabia and Franc nia, being connected with the office of arch-senesch occasioned a very warm contest between the two ele tors. At first it was agreed that the vicariate shou be exercised by both houses at once; but it was terwards resolved that they should enjoy it alternat ly, and this resolution was approved of by the colle of electors, and confirmed by the emperor in 1752.

The elector Palatine succeeded to all the rights dignities of the former electors of Bavaria, and l the laws and government of the country nearly in t same state in which he found them. The states Bavaria are composed of three orders, prelates, bility, and people. In the assembly of the states, t nobility have one half of the suffrages, the other is divided between the clergy and people: thus, wh there are four prelates and four deputies from t towns, there are eight noblemen. The duchy is

1722, by Bauman, the commander of the Dutch vessel Tienhoven, who sailed round the world in company with Roggewain. The inhabitants, who are very numerous, are white, and are armed with bows and arrows. They are represented as friendly to strangers, and of a gentle and humane disposition. W. Long. 173°, S. Lat. 12°. (*j*)

BAUTZEN. See BUDISSEN.

BAY OF ISLANDS, a bay on the east coast of New Zealand, remarkable for the number of islands which embroider its shores. It affords good anchorage, and refreshments of every kind. W. Long. 185° 38′, S. Lat. 35° 18′. See Captain Cook's *Voyages;* and NEW ZEALAND. (*j*)

BAXTER, RICHARD, an eminent divine, was born at Rowton, in Shropshire, November 12, 1615. He was carefully instructed by his father in the principles of Christian piety, and gave early indications of a devout and studious disposition. He was less fortunate in his opportunities of literary improvement, and his first teachers were neither men of great learning nor of good morals. He made very considerable attainments, however, under Mr Owen, master of the free school at Wroxeter, who taught him the elements of grammar; under Mr Wickstead, chaplain to the council at Ludlow, who allowed him the use of an excellent library; and under Mr Garbett, minister of Wroxeter, who carried him through a course of philosophy, and greatly encouraged him in the pursuit of his studies. In 1633 he was persuaded to seek employment at court; and he went to Whitehall, with recommendation to Sir Henry Herbert, master of the revels; but being soon disgusted with that mode of life, and having a strong predilection for the clerical office, he returned home, after little more than a month's absence, and resumed his former studies with redoubled vigour. In the mean time he was appointed master of the free school at Dudley; but his bodily health became so infirm, that, from the 21st to the 23d year of his age, he lived in the constant expectation of death, and was so deeply impressed by a sense of the importance of religion, that he became still more anxious to employ his remaining strength in recommending the subject to his fellow creatures. In 1638 he received orders from Dr Thornborough, bishop of Worcester, and preached frequently at Dudley and the neighbouring villages, with great satisfaction to his hearers. Within less than a year after his ordination he went to associate as assistant to Mr Madstard, at Bridgnorth; and in 1640 he was invited to the office of stated preacher at Kidderminster. Here he employed himself with unwearied diligence in the instruction of his parish, and produced a very remarkable reformation of manners among a very dissolute people. When the civil war commenced, about two years afterwards, he joined with the parliament, and was exposed to several inconveniences on that account. He was obliged to remove his residence, first to Worcester, then to Gloucester, then back to Kidderminster, and then at length to Coventry, where he continued about two years, residing chiefly in the governor's house, preaching both to the soldiers of the garrison and to the people of the town, and exerting himself, with great success and zeal, in repressing the anabaptists, and restraining the violence of the other sectaries. With the view of preventing, still more effectually, the growing influence of turbulent men, he connected himself with the army, and acted for a considerable time as chaplain to the regiment of Colonel Whalley. In 1647 he was reduced to such a feeble state of health, by a frequent bleeding at the nose, that he was obliged to relinquish his employment in the army, and, after remaining some time at the house of Sir Thomas Rouse, he returned to his ministry at Kidderminster. He openly opposed many of the revolutionary measures which now began to prevail; discouraged the taking of the covenant; dissuaded the army from resisting Charless II. at the head of the Scots; expressed his dissatisfaction with Cromwell's usurpation; recommended loyalty to their prince, in a discourse before the parliament; preached a thanksgiving sermon at St Paul's, on account of General Monk's success; after the restoration was appointed one of the king's chaplains in ordinary, and was always treated by him with peculiar respect. He frequently waited upon the king, in order to procure, by his means, more favourable terms for the non-conformists; was one of the commissioners [illegible] the Savoy conferences on the same subject; and was employed to draw up the *reformed liturgy*. He declined the bishopric of Hereford, which was offered to him by Lord Chancellor Clarendon, and desired nothing so much as to resume his humble labours at Kidderminster; but he was so obnoxious to the high-church party, that all the favour of the chancellor could not procure his settlement there, in the way that he approved. He preached occasionally in the neighbourhood of London, till the passing of the act against conventicles in 1662. About this time he married the daughter of Francis Charleton, Esq. [illegible] distinguished magistrate in Shropshire, and lived very quietly, first at Acton in Middlesex, and afterwards at Totteridge, near Barnet. During this retirement, he received various tokens of the royal favour; was consulted upon the plans for settling the ecclesiastical disputes in Scotland; and was offered his choice of preferments in that country. He was one of the principal sufferers in the oppressive severities which were exercised against the non-conformists, during the reigns of Charles II., and his successor James II. He was repeatedly imprisoned, even when he was labouring under the pressure of sickness, and was frequently sentenced to pay very heavy penalties. But nothing could deter him from discharging his ministerial functions, when proper opportunities were presented; and, even when confined to his chamber by increasing infirmities, he continued to expound the Scriptures to all who chose to assemble together [illegible] his seasons of family devotion. He bore his last illness with the most exemplary resignation, and benefited his numerous visitors by his good instructions and example. When constrained, by the extremity of his pains, to wish for death, he used to check himself, and say, "It is not fit for me to prescribe when thou wilt, what thou wilt, how thou wilt." He died at the age of 76 years, on the 8th of December 1691, and his body was accompanied to the grave by many persons of all ranks and denominations.

rson of Mr Baxter was tall, slender, and
his countenance grave and composed,
inclining to a smile; his eye piercing, his
ticulate, and his deportment plain. His
n was weak and sickly through the whole
yet, by the united influence of temperance
ry, he was able to undergo a most extraor-
ree of labour, both in writing and in preach-
xpressed himself in conversation with great
and ease; was remarkable for his intrepidi-
nposure on all occasions; and hence it was
gly remarked of him, by a learned opponent,
could say what he would, and could prove
id." Both in his political and theological
he was always friendly to conciliatory mea-
l hence he has been reviled by the violent,
ted by the temperate, of all parties. His
of moderation, however, were not the re-
feeble or fearful mind; and, while he was
reconcile, he was not afraid to resist. He
to promote universal charity and peace, at
when it was accounted a crime not to be
upport of some sect or other; but, at the
, as was said of him by Mr Boyle, "he
man's displeasure, nor hoped for any man's
t." He boldly opposed the progress of
ary proceedings, and of Antinomian errors;
verities to which he was subjected in the
of his life, were not owing to any suspi-
disaffection to government, but to his up-
wal of non-conformists principles. As a
refutation of the calumnious charges of se-
rebellion which have been brought against
sufficient to mention the many eminent
, both in church and state, whose patron-
timacy he enjoyed to the last; such as the
Lauderdale, the Earl of Balcarras, Chief
atthew Hales, Alderman Ashurst, Sir John
Sir James Langham, Sir Edward Harley,
p Tillotson, &c. He was, in short, a
e greatest zeal in religion, without any ten-
faction or fanaticism; and possessed the
mplicity of manners, with the utmost firm-
nd and uniformity of character.

spect to the literary attainments of Baxter,
himself, that, except the Latin, Greek,
t acquaintance with the Hebrew, he had
skill in languages; that he had no taste
for the mathematics; but that he was par-
ttached to the study of logic, metaphysics,
ogy, and the divinity of the schools. He
desirous to have the knowledge of *things*
rds, and he possessed a great share of solid
His works were so very voluminous, that
t ascertained what was the precise number
ings; but he is known to have composed
145 distinct treatises; of which four were
quartos, 19 12mos and 24mos, besides
ts, separate sermons, and a variety of pre-
e publications of other authors. A parti-
unt of his writings may be seen in the
tan. Notes P and X; and in Calamy's *Life*
, vol. i. p. 691. The most useful of his
s are, his *Catholic Theology;* which was
o compose the disputes between the Calvinists and Arminians;—his *Reformed Pastor;* which has been highly esteemed by many eminent divines;—his *Call to the Unconverted;* of which 20,000 copies were sold in one year; which was translated into most of the European languages; and of which, Dr Watts has said, that he would rather be the author than of Milton's *Paradise Lost;*—his *Christian Directory, or Body of Practical Divinity; Everlasting Rest; Dying Thoughts; Poor Man's Family Book; Paraphrase on the New Testament; Converse with God in Solitude;* and *Narrative of his own Life and Times.* The most of his practical pieces have been published in four volumes folio; judicious abridgments of the best of them have been made by Mr Fawcett; and a new edition of them all is now carrying on, which is expected to be completed in 16 vols. 8vo, one of which will contain a portrait of the author, with a history of his life and times.

The works of Baxter, like their author during his life, have been very variously estimated; but they are highly commended by the most competent and unprejudiced judges. "He cultivated every subject," says Bishop Wilkins, "that he handled." "His practical writings were never mended," says Dr Barrow, "and his controversial ones seldom refuted." "I cannot but commend," says Bishop Gaudens, "the learning, candour, and ingenuity of Mr Baxter." "I cannot forbear looking upon him," says Dr Doddridge, "as one of the greatest orators, both with regard to copiousness, acuteness, and energy, that our nation hath produced." "As an useful writer, as well as a successful controversialist," says Dr Adam Clarke, "Mr Baxter has deservedly ranked in the highest order of the divines of the 17th century. His works have done more to improve the understanding and mend the hearts of his countrymen, than those of any other writer of his age. While the English language remains, and scriptural Christianity and piety to God are regarded, his works will not cease to be read and prized by the wise and pious of every denomination." And, when Mr Boswell inquired of Dr Johnson, which of Baxter's works he should peruse, "read any of them," was the reply; "they are all good." He is indeed generally prolix, and often metaphysical; but such was the taste of the times in which he lived; and his writings are certainly distinguished by amplitude of thought, vivacity of imagination, strong and clear good sense, fervent devotion, and pathetic address. See *Biog. Britannica. Gen. Biography.* Calamy's *Life of Baxter.* Silvester's *Life of Baxter.* Baxter's *Narrative of his own Life and Times.* (*q*)

BAYEN, Peter, a celebrated French chemist, and member of the National Institute of France, was born at Chalons in the year 1725. His early propensity to study induced his friends to send him to the college of Troyes, where he went through a regular course of study, and imbibed a taste for natural philosophy. Anxious to improve his knowledge of chemistry, to which he was particularly attached, he went to Paris in 1749, and studied pharmacy under an able apothecary, the father of the celebrated Charas. The diligence and thirst for knowledge displayed by Bayen attracted the notice of his master, who gave him every opportunity of improvement, and entrusted him with the direction of his laboratory. From the skill which he had acquired in pharmaceutical operations, he was appointed chief apothecary to the army in Germany, during the seven years war, before he had reached his 30th year.

Upon his return to Paris, at the conclusion of the war, he was employed by government to analyse all the mineral waters in France. This labour, at first performed in conjunction with Venel, afterwards devolved upon Bayen alone, who published several works upon this important subject. His analysis of the waters of Bareges and Bagneres de Luchon, is particularly valuable, and is an admirable model for all similar researches.

The funds which were destined for these interesting investigations having been diverted to other purposes, Bayen abandoned the Pyrenees, and employed himself in the analysis of various specimens of minerals which he had collected in his travels. The results of these analyses were published in the *Memoires des Sçavans étrangeres*, in numerous memoirs on marbles, granites, serpentines, porphyries, jaspers, schists, and iron spar.

Bayen had the high honour of being the first who doubted the existence of the phlogistic principle of Stahl. He at first communicated his doubts to several of his friends, but particularly to the celebrated Macquer, who did not approve of them. Without being discouraged at the opinion of Macquer, Bayen continued his researches, and proved, that the excess of weight, the colour, &c. of all metallic oxides, were owing to the absorption of one of the constituent parts of atmospheric air.

The illustrious Lavoisier, who was then occupied with the subject of metallic oxides, happened to be present when the memoir of Bayen was read in the academy; and, struck with the importance of the discovery, he repeated all the experiments, and was thus led to those great views by which he effected a revolution in the science of chemistry.

Bayen discovered the singular property of fulminating, which several metallic oxides possess, when mixed with a small quantity of sulphur. He also found, after long and difficult investigations, that tin, in its pure state, contained a very small portion of arsenic; which, however, did not render it unfit for the purposes of civil life. He found also, that the tin of commerce, which was wrought by pewterers, contained copper and antimony, by which it was hardened; zinc, by which it was whitened; bismuth, which rendered it sonorous; and lead, which diminished its value.

Exhausted with these labours, and worn out with domestic misfortunes, Bayen died in the beginning of 1798, in the 72d year of his age. See Lassus *Notice sur la vie et les Ouvrages du* M. Bayen, in the *Mem. Nat. Instit.* (*r*)

BAYER, John, a German astronomer and lawyer, who flourished about the end of the 16th and beginning of the 17th centuries, and who is celebrated as the author of the first celestial atlas of any importance, and of a valuable improvement in the nomenclature of the stars, which has been adopted by the astronomers of all nations. This improvement, which consisted in denoting the stars of each
constellation by the letters of the Greek alp
published in 1603, in his *Uranometria, si*
asterismorum schemata quinquaginta et
totidem tabulis nova methodo delineata.
Vindelic. Fol. 1603. The second editi
work was published at Ulm in 1648; th
1654; and the fourth in 1661.

The atlas of Bayer was published in a n
1627, under the title of *Cœlum Stellatum*
um, by Julius Schiller of Augsburg, wh
the names of the constellation that were d
the fables of the Greeks, with the pious i
promoting to that high distinction, the
the names of the sacred scriptures. He
twelve apostles in the twelve signs of the
New Testament in the northern hemispher
Old Testament in the southern hemispher

This new scheme, however, did not s
cording to the pious wishes of its autho
heathen names of the constellations were a
retained in all the subsequent editions of t
metria.

About thirty-five years afterwards, i
1662, Philip Cœsius, a Dutchman, prop
milar innovation. He made the constella
Ram, that which Abraham sacrificed f
Isaac. He made the Bull, that which wa
by Adam: The Twins were Jacob and
children of Rebecca, &c. See Astrono
book iii. chap. i. See also Weidler's *Hi*
tronomiæ, pp. 458, 506. Montucla's *His*
themat. tom. ii. p. 251. Bailly, *Hist. de*
Moderne, tom. ii. p. 150. (*o*)

BAYEUX, the *Beducussum* and *Baio*
ancients, is a town of France, in the dep
Calvados, situated on the river Aure. It
magnificent cathedral with three towers;
parishes; seven convents; two priories; tw
and a castle. Bayeux was long celebrat
famous piece of tapestry executed by M
wife of William the Conqueror, and repre
history of the conquest of England. It
web, about 442 feet long, and two feet br
gravings of this curious piece of workmans
has been lately transported to Paris, may
Montfaucon's *Antiq. Expliq.* tom. i. and i
carel's *Anglo-Norman Antiquities.* Bay
on a considerable trade in leather. Popula
West Long. 42′ 51″, North Lat. 49° 16′

BAYJAH, Baia, or Beja, the *Vacca*
and *Baga* of the ancients, is a town of
great trade, in the kingdom of Tunis,
the declivity of a hill on the small river W
All the grain from the fertile plains of
brought to this town, from which it is
the different parts of the kingdom. A p
held here, to which the wandering Arabs
their flocks and manufactures. A cit
strength is situated on the summit of the
the ancient walls, with a few inscriptions,
be seen. East Long. 9° 25′, North La
See Shaw's *Travels*, p. 92. (*j*)

BAYLE, Peter, was born at Car
county of Foix, in the year 1647. He
from his infancy, great intellectual talent

request. And, accordingly, M. Bayle's *Critique Generale* was burnt by the hands of the hangman, and prohibited from being sold under pain of death. This sentence proved as impolitic as it was oppressive; for, being made as public as possible, it excited the curiosity of the people, and determined every one to peruse a volume which the king had thought worthy of such a hard fate. Mr Bayle endeavoured to conceal that he was the author; and so very different was the style of his "General Criticism" from that of his "Letter to the Sorbonne Doctor," that nobody could ever have suspected them to be written by the same hand. But the secret was very soon revealed by accident. M. Jurieu also wrote an Answer to Maimbourg; but, though able and conclusive, it was so inferior to Mr Bayle's, in the public opinion, as to be almost wholly neglected. This circumstance was a mortal offence to Jurieu, which he ungenerously imputed to Mr Bayle, and which he seems never to have forgiven.

About this time Mr Bayle was powerfully solicited to marry. The lady who was proposed to him, and who had consented to be his wife, was young, beautiful, sensible, amiable, and rich. But Mr Bayle, who had no ambition for wealth, and was afraid that the cares of a family would interrupt his studies, positively refused to enter into the matrimonial connection.

In 1683, he published a new edition of his Letter on Comets, under the title *Pensées Diverses ecrites à l' occasion de la Comete qui parut au mois de Decembre* 1680; and also edited, at the request of some friends, several controversial pieces relating to the dispute between the Catholics and the reformed. In the following year he collected a number of fugitive pieces on the Cartesian philosophy, and gave them to the world in a volume entitled, *Recueil de quelques pieces curieuses concernant la philosophie de Mr Descartes.* He introduced them with a preface, in which he gives a succinct account of each of the treatises, and makes some enlightened, pertinent, and feeling remarks on the degraded state to which the press was reduced in France by the law of royal privilege, and on the mischievous consequences which must attend such an inquisitorial and oppressive rule wherever it is established.

In 1684 he began a literary journal. This mode of spreading knowledge, which now prevails so universally, and which has done more than any thing else to enlighten the world, was first introduced by Mr de Sallo, ecclesiastical counsellor in the parliament of Paris, who published the *Journal des Scavans* in 1665. This work, which received great applause, was imitated at Rome in 1668 by Abbot Nazari in his *Journal*, and at Leipsic in 1682 by Menkenius, in his *Acta Eruditorum*. Mr Bayle was surprised that nothing similar had been attempted in Holland, where booksellers and learned men abounded, and where so much freedom was enjoyed, and he resolved to supply such an important desideratum in that country. About the beginning of the year 1684, indeed, a journal was begun at Amsterdam with the title of *Mercure Scavant*, by one de Blegny, a surgeon of Paris: but it was so abusive and so exceptionable in a variety of points, that, so far fro
ing to Mr Bayle to supersede the necessity of
dertaking he had in view, it only stimulated
commence it without delay. Accordingly,
month of May the first number of his Journ
out, under the title of *Nouvelles de la Re*
des Lettres. This work, which continue
published monthly, was divided into two pa
first, consisting of copious extracts from othe
cations; the second, containing a catalogue
books, accompanied with ingenious criticisms,
teresting anecdotes and accounts of the autho
was calculated to gratify both the learned
polite world. At first it was rather profus
commendations; but it assumed by degrees
mild and flattering tone. Though strictly pr
from being circulated in France, many copi
were sold in that kingdom every month: and
ever it appeared it was read with great eagern
universal applause.

This year he had an offer from the states o
land of a professorship of philosophy in the
sity of Franeker: but though the salary th
nearly double of what he had at Rotterd
though the offer was a disinterested tribut
literary merits, he declined accepting their in
His *Critique Generale* was in so much reques
third edition was necessary. He published
considerable amendments, particularly in th
freeing it from those ambiguities and rhymes
he observes, it is extremely difficult to avoid in
the French language. Of this work he pub
continuation in 1685, under the title of *N*
Lettres de l'Auteur de la Critique Genera
The continuation was not so successful. T
which the author had expressed in his advert
were realised. It was misunderstood, dislik
neglected. His journal, which had been ano
during the first year of its existence, he now
proper explicitly to avow; not so much, he
procure distinction to himself, as to shew
magistrates of Rotterdam, from whose new ill
school it proceeded, honoured the muses wi
protection.

Mr Bayle was deeply affected by the revoc
the edict of Nantes, and the horrid persecu
which the reformed in France were consequen
jected; and felt still more indignant when
served the popish writers boasting of their c
and celebrating the immortal glory which L
Great had acquired by rendering France enti
tholic. After speaking of these things in his
with more caution than was natural to him,
(1686) gave vent to his feelings in a little boo
tled, *Ce que c'est que la France toute Catholi*
le regne de Louis le Grand, in which he passe
verest censures on France for the injusti
treachery, the cruelties which it had pract
wards the votaries of the protestant religion
was followed by another volume written
same general view, and in a more argum
strain. Its title was *Commentaire philosoph*
ces paroles de Jesus Christ contraignez les d'en
This work should be read by every statesm
divine, for the sound and liberal ideas of t

it inculcates, and for the strength of argument
earness of illustration with which almost all its
ons on that important subject are accompanied.
ho, after a careful and candid perusal of it,
justify persecution in popish princes in any
or non-toleration in protestants, unless it be
ied with the safety of the state, we must pro-
e to be neither an enlightened Christian, nor a
itizen.

out this time Mr Bayle received letters from
s quarters; from the French Academy, from the
Society of London, and from the Society of
n, approving highly of his Journal, and express-
1 polite terms, their admiration of the genius
it indicated, and their sense of its utility to the
of literature. But while this work advanced
utation, it also involved him in some disagree-
sputes. Some thing which he had published
vas particularly offensive to that strange, clever,
centric woman, Christina Queen of Sweden.
ade one of her servants communicate to him the
l of her complaint. This he answered by a
1 his Journal, which would have satisfied any
ble mind. But finding that the queen's dis-
e was not to be removed so easily, he made a
cantation of his error both in the Journal, and
tter which he was advised to address to Chris-
rself. The strain of this letter is adulatory
wish. It is a great deal more than mere respect
queen's elevated rank, or than mere complai-
to her headstrong humour. It is a practical
tion of that belief which was then entertained
reformed, as well as by the catholics, in the ab-
and divine right of princes; and forms a strik-
d lamentable contrast to that noble indepen-
of language which we should expect to find in
writings of a protestant philosopher. The great
of Mr Bayle, however, was gained. The queen
tisfied. She sent him a gracious and friendly
r, and shewed him other marks of her favour.
yle having been seized with a fever at the com-
ment of the year 1687, in consequence of the
and fatigue which the publication of his Jour-
liged him to undergo, he was under the neces-
giving over that work. A continuation of it
ndertaken at his request by Mr Beauval, under
le of *Histoire des Ouvrages des Scavans.* But
same time it was regularly published under the
le for about two years longer by the original
r of it, with the assistance of a Mr Larroque,
Barin, and other literary characters.

Jurieu being a man of intolerant temper, was
ised with the *Commentaire Philosophique,* and
ook to write an answer to it, in which he at
ispected it to be the production of a cabal of
h refugees, but afterwards distinctly laid it to
arge of Mr Bayle, who had been very anxious
ke the public believe that he was not the author.
g, by proper care of himself, recovered from his
Mr Bayle published a continuation of his *Phi-*
ical Commentary by way of supplement; and
ccasion to notice Jurieu's work, in such a man-
to make him contradict himself, and to expose
ridicule and contempt. In 1690 there appear-
ook, entitled, *Avis Important aux Refugiés sur*
leur prochain retour en France. From what Maizeaux has stated, we have sufficient reason for concluding, that Mr Bayle was the author of this work. But as it contains a severe censure on the refugees for pretended calumnies and attachment to republicanism, and is quite inconsistent with the strain of his other writings, we are at a loss to know the motives which he had for such a publication. Notwithstanding all that his biographer has said to account for this part of his conduct, we cannot but consider it as representing him in a very suspicious and unfavourable light. Indeed, the attempt to justify an action so hypocritical and base, is far more absurd than an implicit belief in the denial of Bayle himself, and the testimony of his eulogist, Mr Beauval. In the year following, one Goudet, a merchant in Geneva, composed a project for a general peace, which Mr Bayle perused in manuscript, and which was afterwards published with his concurrence. Jurieu, who had accused him of being the author of the *Advice to the Refugees,* connecting it in this view with the project for a general peace, thought proper to regard them as decisive proofs of an existing conspiracy in favour of the court of France; and, openly charging Mr Bayle as one of the leaders in it, pronounced him to be *an impious and prophane person, without honour or religion, a traitor, a deceitful man, an enemy to the state; a person to be detested, and deserving of corporal punishment.* To prevent the injury which such a serious attack, if unresisted, must have done to his reputation and his interests, Mr Bayle went to the magistrates of Rotterdam, asserted his innocence in the strongest terms, and demanded that he should not suffer in their estimation till the case was fairly tried. And not satisfied with this appeal to the civil authority, he deemed it expedient to vindicate his character before the world by a public refutation of Jurieu's ridiculous and malevolent libels. This he did in a work entitled, *La Cabale Chimerique,* &c. In this work he kept no terms with Jurieu. He proved him to be ignorant, stupid, arrogant, and wicked; and held him up as a man to be laughed at for his folly, and detested for his malevolence. The burgomasters of Rotterdam, to whom Jurieu applied for protection, advised a mutual reconciliation, and forbade the combatants to publish any thing against one another, without first submitting it to the inspection of Mr Bayer, pensionary of the city. This order, however, was violated by Jurieu, and a long controversy ensued, in which he reaped nothing but disgrace, and which at length was terminated by a dignified silence on the part of Mr Bayle.

Bayle.

In 1693, Mr Bayle was deprived of his professorship and of the salary annexed to it, and even prohibited from teaching privately. This harsh treatment he himself ascribed to the machinations of Jurieu, and to the offence which, through his means, the magistrates had taken at the Letter on Comets. But it would appear that he was mistaken as to the cause of his deposition. The true cause is to be found in the unwarrantable fears, the rash policy, and tyrannical conduct of King William. That prince had heard of the "Project for a General Peace;" and, as the publication of such treatises at Amsterdam had formerly been instrumental in bringing about the peace of Nimeguen, he was afraid that there was a design to make use of the same methods at Rotterdam for putting an end, however imperious, to the important contest in which he was engaged. He therefore, without examining the project itself, or making any enquiry into the character of Mr Bayle, ordered the magistrates to expel him from his office. These men, though perfectly satisfied that the suspicions of William were groundless, and that they were commanded to do what was both unjust and cruel, obeyed the order they had received without addressing one word of remonstrance to the prince, or condescending, as they had promised, to hear the defence which Mr Bayle might think it necessary to adduce. This act of undeserved severity had no disgrace in it except for those by whom it was committed. It neither greatly disturbed the tranquillity, nor at all injured the reputation of Mr Bayle; on the contrary, he bore it with the utmost fortitude and composure. The sense of the public was loudly expressed in his favour. And the same stroke which deprived him of an honourable employment and an independent revenue, afforded him the leisure that he would not otherwise have found, for the composition of a work on which his future fame was principally to rest.

This work was his *Historical and Critical Dictionary*. The original plan, of which he published a specimen in 1692, under the title of *Projet et Fragmens d'un Dictionaire Critique*, was to collect, under the different articles of which he should treat, all the errors and mistatements that were to be found in other dictionaries, and to make remarks on the character of authors as occasion should offer. However interesting and useful such a publication might be deemed, it did not meet with that degree of approbation which could justify the prosecution of his design. He therefore abandoned it, and applied himself to the composition of another dictionary on a more liberal and extended scale. So diligently did he labour, and so much had he his learning at command, that, notwithstanding the interruptions which he repeatedly received from the malice of Jurieu, the frequent necessity he was under of publicly defending himself, the painful indisposition which he suffered in consequence of the closeness and severity of his studies, and other serious disadvantages under which he laboured, his new work, in two folio volumes, was ready for publication in about four years after it was begun. It came out in 1697, with the following title, *Dictionaire Historique et Critique par* Monsieur Bayle. He put his name to this work, contrary to his former unvaried practice, not from any change in his sentiments on that point, but because the states of Holland made it the condition of granting the privilege for which his bookseller had applied. The duke of Shrewsbury, at that time secretary of state in England, expressed a wish that it should be dedicated to him; but Mr Bayle declined complying with his grace's request, both because he had often made a jest of dedications, and because he disdained to praise any one who held an official situation under a prince from whom he had experienced such cruel and unprovoked injury.

The plan of the dictionary is well known. It consists of two parts: one of which is a succinct
of facts, and the other " a large comment
Mr Bayle himself expresses it, " a medley o
and discussions, a criticism of many errors, a
times a long train of philosophical reflections
public were highly pleased with it when it
peared, and to the present day it has conti
be a work of great authority and repute. Tl
ing and acuteness of the author are every wh
spicuous. That freedom of disquisition wh
tributes so much to the elucidation of trutl
dulged in with little reserve. The mistakes
representations of other critics are exposed
facts are brought forward. The merits and
of character are ascertained with much p
The history of literature is, in many cases,
lustrated. Superstition and enthusiasm are
ridiculed. Many maxims of a political, m
philosophical kind are deduced and establish
short, it contains a great deal of useful and e
ing matter, and is written in that easy, pers
and agreeable style by which all Mr Bayle's
sitions are distinguished.

Mr Bayle's dictionary procured for him a
gree of celebrity, but it also involved him i
disagreeable controversy. Jurieu, of course,
very first to attack and decry the merits of tl
Mr Le Clerc found fault with his statemen
Manichean system. Mr Tessier blamed him
ticising falsely, several passages in his " Add
the Eulogies of Learned Men." Mr Jaquelot r
ed him for his alleged heterodoxy respect
will, moral evil, and Pyrrhonism. And by man
he was subjected to the severest censure and an
sion. But against all of them he defended him
boldness, ability, and success. The consisto
Walloon church of Rotterdam, were induced,
the influence of Jurieu, to examine the di
They found many parts of it inconsistent wi
doctrine and with good morals. They com
ted their remarks to Mr Bayle, and gave him
portunity of answering for himself. With
swers, which consisted partly of explanation
of concessions, and partly of promises to c
expunge what had given offence, they declar
selves to be satisfied, and concluded their
ings with presenting to him a memorial of t
cipal things to which they requested his att
the second edition of his dictionary. Jurie
to have been mortified and displeased that M
did not experience a more rigid treatment f
consistory. But that enmity must have bee
sive indeed, which was not fully gratified by
proofs that were administered, and the restra
were imposed on the philosopher, by the hum
of acquiescence and submission in which he r
the ministers, and by the injunctions which t
him to behave with greater moderation toward
rieu; a pastor whose ministry and labours
and still were of singular edification to the c

The second edition of the Critical Dictio
fatigued Mr Bayle; and, in order to relieve
a little, he wrote and published in 1703, a
titled, *Reponse aux Questions d'un Provinci*
treats of a great variety of subjects in

[illegible]

[illegible] is he was [illegible] in the good [illegible] sense of that appellation. These subjects [illegible] been [illegible] viewed but on one side [illegible] prejudices and supersti[illegible] the liberty of thinking over and examin[illegible] and impartiality. His articles are [illegible] explicit statement of the difficulties which [illegible] perplexed and sometimes destroyed [illegible] unsuspected or [illegible] set an example [illegible] of investigating, with minute[illegible] whatever [illegible] are mentioned [illegible] allow them to become articles of faith [illegible] of action. In this respect Mr Bayle [illegible] admitted, acted a rational and useful part. [illegible] the same time it cannot be denied that [illegible] he carried his scepticism to an unreason[illegible] and often gave an interest to the argu[illegible] which does not belong to them [illegible] which cannot fail to be injurious to [illegible] readers. Some parts of his [illegible] of his dictionary are stained with [illegible] and obscene quotations from the volumes of [illegible] This is a defect [illegible] to be lamented [illegible] of its [illegible] and its [illegible] arises however [illegible] from [illegible] and [illegible] wish to support the facts and the positions that were stated that [illegible] depravity in the passions and habits of [illegible] whose moral character, even in the judg-

[illegible]

Mr Bayle [illegible] a great many [illegible] which were given to the world [illegible] Letters of Bayle [illegible] Life of Mr Bayle [illegible] Mr Bayle [illegible]

BAYONET, the name of a short [illegible] dagger, the [illegible] handle of which [illegible] fitted to the [illegible] of muskets [illegible] musket. The [illegible] manufactured in the town of Bayonne, in the department of the Lower Pyrenees, from which it derives its name.

This instrument, which has been used with [illegible] effect by the British and French armies, was first introduced by the French about the end of the 17th century, and was employed with great success in the war of [illegible] See [illegible] Vol. [illegible]

BAYONNE, the [illegible] of the [illegible] is the largest though not the chief town in the department of the Lower Pyrenees. It is [illegible] situated about a league from the western coast of France, at the confluence of the rivers Nive and Adour, by which the town is divided into three parts; the large town on one side of the Nive, the small town between the Nive and the Adour; and the suburb of St Esprit, on the other side of the Nive. A regular square citadel, constructed by Vauban, commands the whole city, which is likewise defended by smaller fortifications. The cathedral of Bayonne is a venerable edifice. The *Place de Grammont* is reckoned the most beautiful part of the city; and so fine is the situation of the town, that there is no part of it from which we cannot see the whole of its buildings, the two rivers which water it, the Bay of Biscay, and the towering summits of the Pyrenees. The *Allées Marines*, or the quays, is a superb and much frequented promenade. A wooden [illegible] bridge, which allows vessels to pass, and where a small toll is collected, connects the suburbs with the town.

Bayonne carries on a considerable trade with Spain, to which it exports woollen cloths, silks, cottons, [illegible] and hardware, in exchange for wines, oil, and wool, and articles from the American colonies. The hams of Bayonne are famous in every part of Europe; and its wines, raisins, and chocolate, are exported in considerable quantities to the north of Europe. The wines of Cape Breton and of Anglet are particularly excellent. Though the harbour of Bayonne is safe, yet its entrance is narrow and dangerous. Masts from the Pyrenees are brought down the river to Bayonne, from which they are exported.

to Brest and other ports of France. The old Biscayan, or Basque language, is generally spoken by the common people. The head dress of the Basque women is said to have a wonderful effect. The chief amusements of the place are bull fights and tennis. Population 13,190. W. Long. 1° 30′ 6″, N. Lat. 43° 29′ 21″. See Link's *Travels in Portugal*, chap. vi. (Q)

BAYREUTH. See BAREITH.

BAZARS, the name given in Turkey and Persia to the exchanges, or to places of public resort, like the market-places of this country. An account of the different bazars, which are often remarkable for their magnificence and splendour, will be found under the names of the towns to which they belong. (*j*)

BDELLIUM, an aromatic gum, formerly used as a perfume and a medicine, but now out of use. It resembles myrrh in its external appearance, and in some of its properties. Its smell is fragrant, and its taste bitter and pungent. (*w*)

BEAM. See CARPENTRY, and STRENGTH OF MATERIALS.

BEANS. See AGRICULTURE *Index*.

BEAR, a wild animal of the mammalia tribe, of which naturalists have enumerated nine different species. In this enumeration, however, they include several animals which have very few properties in common with the bear, and may with greater propriety be reduced under different classes; such are the glutton, the racoon, the beaver, and the different species of the badger. Of the bear, properly so called, there are only three species: the white, or polar bear, called also the sea bear, or *ursus maritimus;* the brown bear, or *ursus arctos;* and the black bear, or *ursus Americanus.* The polar, or sea bear, inhabits the coasts of the Frozen Ocean, and some of its eastern and northern isles, and is not unfrequently conveyed on rocks or islands of ice as far south as Newfoundland. He is much stronger, larger, and fiercer, than either the brown or black bear, and sometimes measures no less than twelve feet in length. His face and neck are more elongated than in the other species, and he is covered with a thick white fur. During winter he lies buried amidst the snow, in a state of torpor; in summer he lives chiefly on fish, but occasionally attacks the seals. The chase of the white bear is a collateral occupation of the mariners who visit the coasts of the Frozen Ocean for the capture of the morsh. In the forests of Great Tartary, Muscovy, and Lithuania, bears are sometimes found of a white colour; but though they resemble the polar bear in that single particular, they are in every other respect completely different. The colour of these animals does not depend, like that of the hair, or ermine, on the rigour of the climate; and they might therefore be regarded as a fourth species, did not the intermixture of brown and white, to be seen in some bears, which are plainly an intermediate race between the white land bear and the brown or black, indicate that the former is only a variety of one of those species.

The brown bear is a fierce carnivorous animal, so extremely voracious, that he not only attacks flocks and herds, but even devours carcases when in a putrid state. The black bear, on the contrary, can never be brought to taste of flesh, nor has he ever been known to attack any animal for the sake of devouring it. Roots and vegetables of every kind constitute his principal food; but his favourite repast is honey and milk, of which the brown bear likewise is excessively fond. The black bear is very rare in Europe, but is extremely common in the forests of America. The brown bear is to be found in almost every latitude of Europe, in China, Japan, Arabia, Egypt, and as far as the island of Java.

The form of the bear is rude and unshapely. His unwieldy body is covered with a coarse and shaggy hide; his legs are thick and muscular; and the long flat soles of his paws, though they enable him to tread with peculiar firmness, render his pace, at the same time, very awkward and heavy. Yet though thus unseemly in his appearance, his senses are extremely acute, and his form combines many advantages which few other animals enjoy. Though his eye is small, and his ear short, in proportion to his size, he possesses in great perfection the senses of hearing and seeing. In no animal is the sense of smelling so exquisite; for the internal surface of his nose is not only very extensive, but of the texture best calculated to receive impressions from odoriferous bodies. His feet, armed with sharp claws, and capable of grasping, somewhat in the manner of a hand, enable him to climb with great facility the most lofty trees: With his fore paws he can strike [illegible] dreadful blow; he can rear himself at pleasure on his hinder paws, and, seizing his adversary in his embrace, can easily squeeze the strongest man to death. The bear delights in solitude, and chooses his den in the precipices of lonely mountains, or in the deep recesses of some gloomy forest. Here he passes the greater part of the winter, without ever stirring abroad. He is not deprived of sensation, like the dormouse or marmot; nor has he, like the ant or the bee, laid up any hoard of provisions for the season. But being excessively fat when he retires in autumn, he seems to subsist chiefly on his own exuberance; the under part of his paws, too, is composed of glands, which are at that time full of a white milky juice, and during his retirement he is said to derive considerable nourishment from sucking them. When he first crawls abroad again in spring, he is extremely lean and feeble, and his feet are so tender that he moves with difficulty. These animals copulate in autumn; the period [illegible] gestation is about four months; and only one or two are produced at a birth. It was long believed that the cub, when first brought forth, was a mere unformed lump, until it was licked into shape by the dam; but the truth is, that the fœtus of the bear [illegible] as completely formed before parturition as that [illegible] any other animal. The young bear is very slow [illegible] growth, and follows the dam for at least a year; during all which time she displays uncommon tenderness for her offspring, and will encounter any danger in its defence.

The bear is in many respects so serviceable to man, that he has at all times been a favourite object [illegible] chase, and many ingenious methods have been devised for catching or destroying him. The most simple and common method is to attack him with deadly weapons, such as spears, clubs, or fire-arms.

ts of Siberia the hunters erect a scaffold
eavy balks piled on each other, under
ced a trap, which the bear no sooner
he brings down the whole scaffold upon
is crushed beneath its weight. Some-
dug, in which are fixed smooth, solid,
inted posts, rising about a foot from the
e mouth of the pit is carefully covered
ls, and across the bear's track is placed
gbear, connected with a thin rope. As
touches the rope, the bugbear starts
he terrified animal, flying with preci-
s violently into the pit, and is pierced
ed stake. Should he escape this snare,
d other annoying instruments, await him
ance. Amongst them is a similar frightful
persecuted beast, in striving to get free,
mself faster to the spot, where the hun-
nbush ready to take his aim. Nor is it
e ground that the bear is exposed to dan-
cruel invention of man. In some parts of
common to set fire to the trees on which
fuge, and they are easily despatched as
. The Koriaks attach a noose to the
crooked tree, hanging something along
ich the bear is fond. Lured by this bait,
limbs the tree: in attempting to seize
neck is introduced into the noose, and
nging violently back into its former direc-
he animal suspended in the air. The plan
the mountaineers of Siberia to make the
self, is yet more singular and ingenious.
a very heavy block to a rope, terminating
nd with a loop. This block they lay near
ipice in the wonted path of the bear.
neck in the noose, and unable to proceed
, he takes it up in a rage, and, to disen-
elf, throws it down the precipice; he is
lled after it, and is generally killed by
he happens to survive the first shock,
ags the block up the steep, and renews
r freedom, till, with increasing fury, he
erveless to the ground, or, by one decisive
an end to his torments. In Kamtshatka
so harmless and familiar, that women
out fearless amidst a whole drove of
er herbs and roots, and they often ap-
to eat out of their hand. They have
known to attack a man, except when
their sleep, and even when wounded sel-
pon their pursuer. Yet this harmless
the Kamtshadale bear gives him no secu-
persecutions of mankind. Armed with
ears, the hunter traces the bear to his
, intent only on defence, gravely collects
brought by his persecutor, and chokes
nce to his den. The hunter then bores
gh the top of the cavern, and in perfect
ars his defenceles foe. "It would be
ys Mr Tooke, "to name a species of
pting the sheep, so variously serviceable
to man as the bear is after his death to the Kamtshadales. Of the skin of this animal, they make beds, covertures, caps, gloves, and collars for their sledge-dogs. Those who go upon the ice for the capture of marine animals make their shoe soles of them, which have this advantage, that the wearer is not in danger of slipping with them. The fat of the bear is held in great estimation as a very savoury and wholesome nourishment, and when melted, and thus rendered fluid, supplies the place of oil. The flesh is reckoned such a dainty, that they seldom eat it alone, but usually invite a number of guests to partake of the delicious repast. The intestines, when cleansed and properly scraped, are worn by the fair sex as masks to preserve their faces from the effects of the sun-beams, which here, on being reflected from the snow, are generally found to blacken the skin, by which means the Kamtshadale ladies preserve a fine complexion. The Russians of Kamtshatka make window-panes of the intestines of the bear, which are as transparent and clear as those made of Muscovy glass. Of the shoulder blades are made sickles for cutting grass. A light black bear-skin is one of the most comfortable and costly articles of the winter wardrobe of a man of fashion at Petersburg or Moscow, and even the small white hand of a belle is slipt into the large bear-muff, which covers half of her elegant shape." See Buffon's *Natural History*, vol. vi. 12mo; Tooke's *View of the Russian Empire*, vol. iii. p. 53—59. (μ)

Beard.

BEARD, the hair which grows upon the chin and contiguous parts of the face, in males, and sometimes, though rarely, in females, at the age of puberty. The growth of the beard, in men, is a sign of maturity, or approaching manhood; and takes place at the period when the seminal secretion commences. When that secretion stops, from any derangement of the system, it is said that the beard falls off; and when the secretion discontinues, in old age, the beard grows thin, and flaccid. The beard has, therefore, an intimate sympathy, with this change in the constitution of the male. Bearded women are all said to want the menstrual discharge; and various instances are given by Hippocrates, and other physicians, of grown females, especially widows, in whom beards appeared upon the discontinuance of this discharge.

Many instances are recorded, by different writers, of women with remarkably long beards. Eusebius Nierembergius mentions a woman who had a beard reaching even to her navel. Charles XII. had in his army a female grenadier, who, both by her courage and her beard, might well have passed for a man. She was taken at the battle of Pultowa, and carried to Petersburg, where she was presented to the czar in 1724; at which time her beard measured a yard and a half. We read in the Dictionary of Trévoux, that there was a woman seen at Paris, who had not only a bushy beard on her face, but likewise her whole body covered over with hair. The celebrated Margaret, governess of the Netherlands, had likewise a very long stiff beard, on which she greatly prided herself, and was very solicitous to preserve it undi-

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ps are irons with four spikes, so formed, that whatever way they fall, one point always lies upward, generally
hes and on bridges to annoy an enemy's horse. This name is also given to an instrument with three iron spikes,
the wolf.

shed. The Lombard women, it is said, when accompanying their husbands to the field of battle, [illegible] to assume the appearance of beards, by an [illegible] disposition of the hair of their heads upon their cheeks; and the Athenian women, according to [illegible] did the same thing in a similar case.

The American savages have thin and scanty beards, which they are in general solicitous to extirpate by the roots. The beard of the negro is short and [illegible], like his hair; that of the Greenlander, Samoiede, and of all savages who live a life of hardship and penury, is generally thin, and stinted in its growth. The fashion of the beard has greatly varied in different ages and countries; for sometimes it has been deemed honourable and becoming to permit it to grow to its utmost extent; and sometimes it has been fashionable to cut it off entirely, or to permit it to remain only on a particular part of the face, or cut into a particular form. In mentioning the most remarkable of these peculiarities, we shall speak, 1st, Of the eastern nations; 2dly, Of the ancient Greeks and Romans; and, 3dly, Of the modern inhabitants of Europe.

I. Among the eastern nations, the ancient Egyptians left only a little tuft of hair at the extremity of the chin. The Hebrews wore a beard on the chin, but not on the upper lip; and they were prohibited by Moses to manage their beards after the Egyptian [illegible]. The Jews of the present day suffer a little [illegible] of hair to grow from the lower end of their ears to their chins, where, as well as on their lower lips, their beards are in a pretty long bunch. Strabo remarks, that the ancient Indian philosophers, called Gymnosophists, were particularly solicitous to have long beards, as symbolical of wisdom. The ancient Assyrians and Persians also prided themselves on the length of their beards; and Chrysostom informs us, that the kings of Persia had their beards interwoven, [illegible] with gold thread; a practice which was also adopted by some of the first kings of France.

According to Le Compte, the Chinese greatly affect long beards; which, however, nature has denied them; and there is nothing on account of which they are more envious of Europeans than the great [illegible] of their beards. The Tartars, out of a religious principle, as Kingson assures us, waged a long [illegible] war with the Persians, considering them [illegible] because they would not cut their whiskers after the Tartarian mode, though, in other respects, [illegible] faith with themselves. The Persians are [illegible] only Mahometans who clip the beard, and [illegible] the jaw; and on this account are deemed [illegible] their neighbours. The Arabs make the [illegible] of their beards a capital point of religion, [illegible] Mahomet never shaved his. Among [illegible] is nothing more infamous than to [illegible] cut off. The slaves in the seraglio [illegible] a mark of servitude; and are only permitted [illegible] their beards to grow when they receive [illegible]. The custom of anointing the [illegible] among the Turks, as it did among the [illegible] Romans; and one of the principal [illegible] observed in the serious visits of this people, [illegible]-scented water on the beard of the [illegible] perfume it afterwards with aloes-wood,

which adheres to this moisture, and give it a
able smell. The Turks, when they com
beards, hold a handkerchief on their knees, a
fully gather the hairs that fall, which they aft
deposit in the place where they bury the dea
Turkish wives salute their husbands, and t
dren their fathers, by kissing the beard;
same ceremony is used by the men when th
procally salute one another.

II. Among the ancient Greeks and Rom
beard was scarcely less venerated than am
eastern nations. Homer speaks in high prai
snow beards of Nestor and king Priam; an
celebrates that of Mezentius, which was so l
thick as to cover all his breast. Pliny the
mentions the white beard of Euphrates, a Syr
losopher, which, he says, inspired the peop
respect, mingled with fear; and Plutarch sp
the long white beard of an old Laconian, wh
asked why he allowed it to grow so luxuria
plied, "In order that, having my white bea
tinually in view, I may do nothing unworth
whiteness." The Greek philosophers distin
themselves from the vulgar by the length
beards: a practice, according to Laertius, firs
duced by Antisthenes, (l. 6.) The Roman
phers affected the same distinction, as we find
race:

——————*Tempore quo me*
Solatus jussit sapientem pascere barbam.
Hor. l. ii. sat. iii. v.

The Greeks continued to wear their beard
time of Alexander the Great, as Athenæus
us, from Chrysippus; adding, that the first
his beard at Athens, ever after bore the ap
of *κοϱσης*, or *shaven*. The Macedonians,
appear to have cut their beards before this
as Philip, the father of Alexander, and Amy
Archelaus, his predecessors, are represented
dals without beards. The reason assigned
tarch, for Alexander commanding the Mac
to be shaven, was, that their beards might
a handle to their enemies in the day of battle.
one of Alexander's battles, we are told, wh
menio presented himself, to give an accoun
arrangements, and to inquire, whether any t
mained to be done? "Nothing," said Al
"but that the men should shave." "*Shave*
Parmenio: "Yes," replied the king, "
not consider what a handle a long beard af
the enemy?" (*Dornav. Amphith. Sapientiæ.*
Greeks continued to shave the beard till the
Justinian, under whose empire long bear
again into fashion, and so continued till C
nople was taken by the Turks.

The Romans anciently wore long beards a
as we find by a variety of authorities. Th
speaking of the senators who remained in R
ter the entrance of the Gauls, mentions, t
wore a long beard: *ut tum omnibus promis*
(lib. v.); and Cicero, in his oration for Cæli
tions the *barba horrida quam in statuis an*
imaginibus videmus. According to Pliny,
mans knew nothing of shaving till the year o

hen P. Ticinius brought over a number of
from Sicily; and he adds, that Scipio Afri-
ras the first that introduced the mode of sha-
ery day. The first fourteen Roman empe-
ived; but Adrian wore his beard, in order, as
h informs us, to hide the scars on his face.
nus Pius, and Marcus Aurelius, wore a beard,
he character of philosophers.

first shaving of the beard was a matter of great
ty among the Romans, and was generally per-
when the *toga virilis* was assumed. The first
of the chin was consecrated to some god,
to the Lares; visits of ceremony were paid on
asion; and persons of quality had their chil-
aved, for the first time, by others of the same,
reater quality; who, in this manner, became
ptive fathers of the children. Nero consecra-
beard, when first shaved, to Jupiter Capitoli-
a gold box set with pearls. For the sake of
ion, the Roman slaves wore their beard and
ng; and, when manumitted, they shaved the
the temple of Feronia, and put on a cap, or
as a badge of liberty. The Roman soldiers,
r, seem to have worn their beards short, and
l, as we find upon ancient monuments.

me of grief and affliction, the Romans suffered
ard and hair to grow; whereas the Greeks,
of sorrow, shaved themselves, and cut their
Senec. *Benef.* v. 6.); which was also the cus-
iong some barbarous nations. On like prin-
the custom of letting the beard grow is a to-
mourning in some countries, as that of shaving
hers.

Among the inhabitants of modern Europe,
hion of wearing the beard, like all other
s, has undergone a variety of vicissitudes.
f our Gothic ancestors shaved, or wore hair
the upper lip, or in the form of mustaches.
ombards, however, who invaded Italy, were
able for the length of their beards; and hence
ame of *Longobardi*. Among the Franks, who
l Gaul from the Romans, a long beard became
icteristic of nobility; as, under the Roman
ty in that country, none but nobles and
an priests were permitted to wear it. The
ngian, or first race of kings in France, were,
account, particularly solicitous of copious
and flowing hair. They are described by
rd, the secretary of Charlemagne, as coming
assemblies of the people, in the field of Mars,
on a throne, in a carriage, or waggon, drawn
n, with long beards and dishevelled hair:
*ropeso, barba submissa, solio residerent, et
dominanter effingerent.*

ancient Britons, in the time of Cæsar, wore
ds, except on the upper lip. But the Anglo-
, on their arrival in Britain, and for a consi-
time after, allowed their beards to grow.
however, the Normans possessed themselves
country, the beard had been reduced to its
standard, and was entirely proscribed by that
who held beards in abhorrence. It is men-
by some of our ancient historians, as one of
st wanton acts of tyranny in William the Con-
that he compelled the English, who had
been accustomed to allow the hair of their upper lips to grow, to shave their whole beards. This was so disagreeable to some of the people, that, rather than relinquish their whiskers, they chose to abandon their country. The Russians, it is well known, shewed an equal repugnance to be shaved, when they were ordered to part with those beards, of which their ancestors had enjoyed the undisturbed possession, by an edict of Peter the Great. Many of them chose rather to pay a fine, or tax, than submit to this degradation; and those who were too poor, or too parsimonious to comply with this alternative, religiously preserved the beard that was shorn off, and had it deposited in their coffins, that they might present it to St Nicholas, on his refusing to admit them into heaven as beardless Christians.

In the middle ages of Europe, the beard was occasionally in high repute: Thus, in the 10th century, King Robert of France, the rival of Charles the Simple, was not more famous for his exploits than for his long white beard, which he suffered to hang down on the outside of his cuirass, to encourage his troops in battle, and rally them when defeated. In the 14th century long beards were much in fashion, and continued to be the mode till the close of the 16th century. The Emperor Charles V., Pope Julius II., and Francis I. of France, were all great admirers of long and bushy beards. At this period, John Mayo, a celebrated painter in Germany, had so vast a beard, that he was nick-named John *the Bearded*. Though he was a tall man, it was so long that it would hang upon the ground when he stood upright; so that he usually wore it fastened to his girdle. The Emperor Charles used to take great pleasure in seeing this extraordinary beard unfastened, and the wind blowing it against the faces of the lords of his court. The beard of Sir Thomas More is honourably noticed in history; and we find, from the portraits of Bishop Gardener, Cardinal Pole, &c. that beards were of an uncommon size in England in the reign of Mary I.

The beard of Henry IV. of France, which was square in form, was an object of much admiration on account of the majesty which it communicated to the fine open countenance of that amiable monarch. Beards, therefore, were in the zenith of their reputation during this auspicious reign. But no sooner was the throne occupied by the successor of this monarch, Louis XIII. then a beardless youth, than,—such is the instability of all human greatness!—beards were entirely proscribed, or reduced to the insignificant size of whiskers. The duke of Sully, however, evinced his attachment to the memory of his master, by wearing the beard of the ancient court, notwithstanding the ridicule it brought upon him. Whiskers continued to prevail during the early part of the reign of Louis XIV. They were the ornament of Turenne, Condé, Colbert, Corneille, Moliere, &c.; and the king himself took a pride in wearing them. Much pains was bestowed in rendering them captivating during this age of gaiety and gallantry; and the beauty of a lover's whiskers was then a subject of exultation to a favourite fair.

The Spanish beard suffered degradation from a cause similar to that which occasioned its dishonour ancement of this sublime and beautiful science, bit theorems for calculating the number of iade in a given time, divested as much as pos- ; the difficulties likely to deter the practical nd musician from attempting to understand ply them to use, illustrated by an example in se. For the satisfaction of such as are unable lling to go into the nice and difficult theory ch these theorems are founded, nothing is so o inspire confidence in their truth, as well as ight application of the rules they furnish to lar cases they may undertake to calculate, as ing several such theorems, involving different et by means of which the same results are to ined.

he five methods given below, for calculating ts of any tempered conchord from different e two first only have hitherto been published, s we are acquainted; the first is the original of Dr Smith, *Harmonics*, prop. xi.; and the is that of Mr Emerson, *Algebra*, prob. ccii.

thod of calculating the Beats of an Imperfect Conchord.

the conchord, whose perfect ratio is expressed n being the *least* term of the ratio in its *lowest* be tempered by the fraction $\frac{q}{p}$ of a major *com-* being the *least* term of this fraction;) also let N be the number of complete vibrations in ond of time, made or excited by the *acute* and *ve* notes of the above tempered conchord re- ely: and let b be the number of *beats* occasion- his temperament in one second.

if the tempera- e *sharp*, or the *reater* than per- $\Bigg\}\ b = \frac{2q \times m \times N}{161p - q}$ or $\frac{2q \times n \times M}{161p + q}$

the tempera- e *flat*, or the *less* than per- $\Bigg\}\ b = \frac{2q \times m \times N}{161p + q}$ or $\frac{2q \times q \times M}{161p - q}$

Example.

conchord proposed, be the minor sixth ($\grave{\text{C}}b\text{A}$) of anhope's monochord system: here $\frac{5}{8} = \frac{n}{m}$ is the the perfect conchord, and (*Phil. Mag.* xxvii. $\frac{21}{22} = \frac{q}{p}$ is the part of a comma nearly, (not $\frac{20}{21}$, eously printed), by which the same is flatten- o N=240, the number of complete vibrations e bass note in 1″: and from the first of the the theorems above,

$$\frac{2 \times 21 \times 8 \times 240}{161 \times 22 + 21} = \frac{80640}{3563} = 22.6326,$$ the 1″.

2d *Method.*

Let the conchord, whose perfect ratio is expressed by $\frac{n}{m}$, (n being the *least* term of the ratio in its *lowest* terms) be tempered so that its *string*, which, for sounding the *treble* note of the perfect conchord was S in length, is altered to be s length: also let N be the number of complete vibrations in one second of time made by the bass-note of the conchord; and let b be the number of beats occasioned by this temperament in one second of time.

Then, if the temperament be *sharp*, $b = \frac{S - s}{s} \times N \times m$.

Or, if the temperament be *flat*, $b = \frac{s - S}{s} \times N \times m$.

Example.

If the conchord proposed, be the minor sixth of Earl Stanhope's monochord system: here $\frac{5}{8} = \frac{n}{m}$ is the ratio of the perfect conchord, and (*Phil. Mag.* xxvii. 196, and xxx. p. 1.) S=.625, and s=.6324554, are the lengths of string for sounding this perfect and tempered conchord with the bass-note =1, respectively: also N=240, the vibrations of C the bass-note in 1″, and from the second theorem above, we have

$$\frac{.6324554 - .625}{.6324554} \times 240 \times 8 = \frac{14.314368}{.6324554} = 22.6330,$$

the beats in 1″.

Corollary. If in this method, the bass-note be considered as unity, then $S = \frac{n}{m}$, and our theorems become,

For *sharp* temperaments, $b = \left(\frac{n}{s} - m\right) \times N$

For *flat* temperaments, $b = \left(m - \frac{n}{s}\right) \times N$

And the above example will stand thus; viz.

$\left(8 - \frac{5}{.6324554}\right) = 240 = .094306 \times 240 = 22.6334$, the beats in 1″.

3d *Method.*

Let the conchord whose perfect ratio is expressed by $\frac{n}{m}$, (n being the *least* term of the ratio in its *lowest* terms,) be tempered by l *logarithms*, (of seven places, wherein 1.0000000 expresses the key, and .6989700 the octave:) also let M and N be the number of complete vibrations in one second of time, made or excited by the *acute* and *grave* notes of the above tempered conchord respectively; and let b be the number of *beats* occasioned by this temperament in one second.

Then, if the temperament be *sharp*, $\Big\}\ b = \frac{2l \times m \times N}{8686000 - l}$ or $\frac{2l \times n \times M}{8686000 + l}$

Or, if the temperament be *flat*, $\Big\}\ b = \frac{2l \times m \times N}{8686000 + l}$ or $\frac{2l \times n \times M}{8686000 - l}$

Example.

If the conchord be the minor sixth of Earl Stanhope's monochord system: here $\frac{5}{8}=\frac{n}{m}$ is the conchord, and (*Phil. Mag.* xxvii. 195.) $l=$ a *flat* temperament of 51500 in seven place logs. Also N=240, the vibrations per 1″: and from the first of the lower theorems, we have

$$\frac{2\times51500\times8\times240}{868600+51500}=\frac{197760000}{8737500}=22.6335,$$ the beats in 1″.

4th Method.

Let the conchord whose perfect ratio is expressed by $\frac{n}{m}$, (n being the *least* term of the ratio in its *lowest* term,) be tempered so that its *acute* and *grave* sounds make M and N complete vibrations in one second of time, respectively; and let b be the number of *beats* occasioned by this temperament in one second of time.

Then, if the temperament be *sharp*, $b=n\mathrm{M}-m\mathrm{N}$.
Or, if the temperament be flat, $b=m\mathrm{N}-n\mathrm{M}$.

Example.

If the conchord be the minor sixth of Earl Stanhope's monochord system, here $\frac{5}{8}=\frac{n}{m}$ is the conchord, and (*Phil. Mag.* xxx. p. 5.) M=379.47 and N=240 are the vibrations respectively; and from the second of the above theorems we have,

$8\times240-5\times379.47=1920-1897.35=22.65$ the beats in 1″.

5th Method.

Let the conchord, whose perfect ratio is expressed by $\frac{n}{m}$, (n being the *least* term of the ratio in its lowest terms) be tempered by r *Schismas* (Σ in the Table, Plate XXX.), neglecting the smaller intervals most *minute* (m) and lesser *fraction* (f), should they occur, and if great accuracy is sought, substituting their value in decimals of Σ: also let M and N be the number of complete vibrations in one second of time made by the *acute* and *grave* notes of the above tempered conchord, respectively; and let b be the number of *beats* occasioned by this temperament in one second.

Then, if the temperament be sharp, $b=\frac{2r\times m\times\mathrm{N}}{1772-r}$ or $\frac{2r\times n\times\mathrm{M}}{1772+r}$ *.

Example.

If the conchord be the minor sixth of Earl Stanhope's monochord system, here $\frac{5}{8}=\frac{n}{m}$ is the conchord; and (*Phil. Mag.* xxviii. 141.) $r=$ a flat temperament of 10.5 schismas; and N=240, the vibrations of the bass per second: and from the first of the lower theorems above we have,

$$\frac{2\times10.5\times8\times240}{1772+10.5}=\frac{40320}{1782.5}=22.6199,$$ the beats in 1″.

Note. .0078631 × Σ = m, and 127.1905 × m = Σ; also .149661 × Σ = f, and 6.5297 × f = Σ. The near coincidence of the above six results would have been still more complete, but that the first, third, and fifth methods are founded on approximating theorems, and the vibrations M, used in the fifth method, are not given to places enough of decimals to insure a result equally accurate with the other calculations.

By two, at least, of the above methods, the beats produced by every conchord, throughout several tempered systems, have been calculated, and will be given in Tables, under the names of those systems, or that of their respective authors, as HAWKES, SMITH, STANHOPE, YOUNG, &c.; reserving an account of such systems as may come to our knowledge, but under no well-known name, for the article TEMPERED SYSTEMS of Music, wherein we shall endeavour to draw some comparisons between the different systems of temperament, whose correct results will thus be exhibited, in a form perfectly adapted for comparing their respective merits: and we propose, to aid these comparisons, by some new and general investigations, on the relations subsisting between the temperaments of the different conchords, in every *donzeave*, or tempered system of twelve intervals, only within the octave. (ε)

BEATON, or BETON, DAVID, archbishop of St Andrews, primate of Scotland, and cardinal of the Romish church, the son of John Beaton of Balfour, in Fife, was born in 1494. He was educated at the university of St Andrews, and gave early indications of strong mental powers. Being destined for the church, he was sent, by his uncle, the archbishop of St Andrews, to complete his education at the university of Paris; and, as soon as he attained the usual age, he was admitted to holy orders. In France he was early received into the favour and service of the Duke of Albany, regent of Scotland, during the minority of James V.; and, by him, in 1519, he was appointed Resident at that court. About the same year, his uncle bestowed upon him the rectory of Campsie; and, in 1523, vested him with the abbacy of Aberbrothock. He returned to Scotland in 1525, and received the privy-seal in 1528. In 1533, we find him, in conjunction with Sir Thomas Erskine, returning to France, to confirm the treaty entered into between the two nations, and to demand in marriage for his sovereign the daughter of the French king. During his residence at that court, he insinuated himself into the good graces of Francis; was favoured with a knowledge of the whole political system of that great monarch; and, by his influence in bringing over his sovereign to adopt the same political views, he laid the foundation of his own future greatness. The nuptials of the Scottish king and the young princess, were celebrated at Paris, on the 1st of January 1537; and Beaton returned with them to Scotland in the ensuing May; but the queen having survived her marriage only two months, he was again sent to Paris,

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* If very great exactness is required, 1772.243 may be used instead of 1772.

Beaton, Beattie.

all the workmen and servants, to the number it is said of 150, with so little noise, that the cardinal was not awaked till they approached the door of his chamber, which he immediately secured. Being prevailed upon to open it, by a promise, that no violence should be offered to his person, they rushed in with drawn swords, and put him to death. His body, it is said, was shown to the populace at that window from which he had lately, with a barbarous joy, beheld the death of the innocent Wishart.

Thus fell this eminent prelate, who was not more distinguished by his rank, than odious by his vices. Endowed with great abilities, he raised himself to the highest station; but his ambition was unbounded, and his pride insupportable. He was the favourite of the regent, Duke of Albany, and of James V.; and so entirely did he gain the confidence of every person whom he served, and so artfully did he manage his ascendancy over them, that his own influence was never diminished. Bred to business, he was but little acquainted with the learning and controversial writings of the age; but he had studied politics at the court of France, and was well acquainted with the temper and influence of all the nobility of his own country. He took into his own hands the management of the affairs of the kingdom, both civil and ecclesiastical; and he often treated the ambassadors of foreign states with all the supercilious demeanour of an arbitrary monarch. Bent upon the execution of all his schemes, he scrupled not by what means he gained his end; and he frequently sowed the seeds of discord among his enemies, that he might reap security from their dissensions. Devoted to the church of Rome, he promoted her cause by the most cruel and sanguinary measures; and though the manner of his death cannot be justified, it spread an universal joy among all the friends of the reformation. He amassed great wealth, which he bequeathed to his natural children. To each of his three sons he left a valuable estate, and his three daughters obtained marriages in three families of distinction in Scotland. Had his virtues been equal to his abilities, and his life suitable to his high rank, he would not have fallen by the hand of an assassin, nor would his character have stained the page of history. He is an eminent instance of the union of great talents with great vices; and his life, as well as his death, may teach a valuable lesson to mankind. See Buchanani *Hist.* lib. xiv, xv. Robertson's *Hist.* vol. i. p. 96. *Biograph. Britannica*, vol. ii. p. 37. (A. F.)

BEATTIE, James, an excellent poet and essayist, was born on the 5th of November 1736, in the parish of Laurencekirk, Kincardineshire, Scotland. His father kept a small retail shop in the village of that parish, and at the same time rented a small farm in the neighbourhood, in which his forefathers had lived for many generations. The poet's mother was left a widow when young Beattie was only ten years of age; but the loss of a protector was happily supplied by his brother David, who sustained him in his school education, till he obtained, by his promising abilities, a bursary or exhibition at Marischal college, Aberdeen. Here he studied Greek under Professor Blackwell, author of two works, entitled, the *Court of Augustus*, and the *Life of Homer*; a man grievously infected with the pedantry of Lord Shaftesbury's style, but possessed of considerable learning, and meriting mention in Beattie's life as the first who encouraged his early genius. Having taken the degree of master of arts, at the end of four years attendance at the university, our poet filled the humble situation of schoolmaster in the neighbouring parish of Fordun. His employment here did not preclude him from that slight attendance to the study of divinity which the preparation for holy orders requires in Scotland, nor from occasionally cultivating his muse. Never did poetical talent ripen so slowly as with Beattie. Till the age of 25 he wrote indifferent verses; and within ten years from that period, he was, excepting Goldsmith, the purest and most majestic poet of his own time. Yet his early and indifferent productions, which he transmitted to the Scottish Magazine, gained him a little local celebrity. Mr Garden, a Scottish lawyer of some taste and ingenuity, afterwards Lord Gardenstone, and at that time sheriff of Kincardineshire, afforded him a sort of patronage, and introduced him to the tables of the gentry in that neighbourhood; an honour not often extended to the humble teacher of a parish school. In 1757, a vacancy occurred in the grammar school of Aberdeen and Beattie stood competitor. He was foiled by candidate who surpassed him in the minutiæ of Lati grammar, but though unsuccessful, he retired without disgrace; and a vacancy in the same school soon after occurring, he was appointed successor without a trial. In this new situation his reputation extended with the sphere of his acquaintance; he became known by his conversation and talents, among a discerning community; and at 24 years of age, we find him obtaining, through the reputation of those abilities, the professorship of moral philosophy in the Marischal college of Aberdeen; a place in which he became the associate of such eminent men as Dr Re Dr Campbell, and Dr Gregory, who then graced the university. In 1760, he published a small collection of poems, the most of which he was afterwards ashamed to print, in company with his *Minstrel*. He actually bought up and destroyed as many copies as he could find of this unhappy volume in the days of his established fame. In 1763, he made his first visit to London, but he seems at that time to have been unnoticed and unknown. In 1766, he married a Mi Dunn, a woman of some beauty and accomplishments, but with whom his union proved an abundant source of domestic misery—the dreadful malady of an hereditary madness, which at last made it necessary to confine her, for a long time showed itself equivocally before it came to a crisis, in the caprice of her dispositions, and the inquietude of her temper. In 177 he published his *Essay on Truth*; and in the following year, the first part of his exquisite poem the *Minstrel*.

During the summer of the latter year he paid second visit to London, which he renewed in 177 During this last visit he was made a doctor of laws by the university of Oxford, and obtained the king warrant for a pension of £200 a-year. The honour

aid to him during this year, made it, at
n opinion, the most distinguishing era of
was courted by peers and bishops as the
mpion of truth. The English church-
rthodox gentry had been long indignant
s of Hume and the Scottish sceptics,
applauded an antagonist who had un-
answered Hume no better than them-
d not occur to those pious people, that
which Beattie had answered by abuse
es, related to abstract questions wholly
practical virtue or vice; and they for-
eley, at least as good a Christian as any
had gone half way in the very scepti-
ume inculcated. Dr Reid, who has
me with the hard sinews of argument
ics, was not half so popular a champion
and lay alarmists at infidelity. He was
outrageous, or abusive, and he required
thinking and study to follow him; a
wholly spared to the readers of Beattie's
th. At this flattered period of his life,
troduced to their majesties at Kew, and
r in familiar conversation with them.
gratulated him on having refuted Hume,
sale of his book. In the aristocracy
however, kings themselves have no pow-
g rank; and while we admire a vener-
encouraging and communing with an
f letters, yet when we hear it announced
loset, that Mr Hume's publishers had
the writings of Beattie, we are apt to
ow seldom kings are told the truth.
k the poet in the philosopher in com-
seems to be absolute satire. Yet though
tie's splendid reception among the peers
was owing to his over-rated merits as a
, there was much of it also due to his
ers and his genius.

f the year 1773, there was a proposal for
m to a professorship in the university of
hich he declined. The reason which he
f his letters, was the fear of hostility from
nies; a reason which has been exposed ve-
a harsh review of his life. There may be
this declaration of the soreness respect-
opponents, which was certainly a weak-
e; but there is nothing in it worthy of
ch. The disciples of the sceptical phi-
ot entirely exempt from the human
ating their literary antagonists; and if
d to encounter that spirit in Edinburgh,
onder at his preferring to remain amidst
orthodoxy of Aberdeen, rather than to
mong strangers, nor at his giving the
a confidential letter. His refusal of
church of England, proffered to him
us in 1774, was dictated by disinterest-
hich have never been called in question.
ere is little incident in his life. He pub-
me of Essays in 1776, and another in
reatise on the Evidences of Christianity,
the outline of his Academical Lectures
the same year he edited at Edinburgh
ers, and wrote a preface. He was very unfortunate in his family. The situation of his wife precluded him from the enjoyment of visitors in his house at the time when his increased circumstances would have allowed him to exercise a limited hospitality. The loss of his son, James Hay Beattie, a young man of highly promising talents, and who had been actually conjoined with him in the professorship, was the greatest, though not the last, calamity of his life. He made an effort to relieve his spirits by another journey to England, and some of his letters from thence bespeak a temporary composure and cheerfulness; but the wound was never healed. Music was one of the great solaces of his leisure hours; but from that solace he was cut off by the overwhelming associations which were excited by the amusement which his son and he had shared in common. At the end of six years, his second son, Montague Beattie, was also snatched from him in the flower of manhood. This crowning misfortune appears to have wholly crushed his spirits. With his wife in a mad-house, his sons dead, and his health broken, he might be pardoned for saying, whilst he looked upon the corpse of his youngest child, " I have done with this world." He acted indeed as if he had felt so; for although he performed the duties of his professorship till within a short time of his death, he applied to no study, enjoyed no society or amusement, and answered but few letters of his friends. " Yet amidst the depth of his regret, he would sometimes express an acquiescence in his childless fate." How could I have borne," he would say, " to see their elegant minds mangled with madness!" A palsy, which struck him in 1799, terminated his sufferings, after repeated attacks, in 1803. " His person," says a writer of his life in the Annual Register for 1805, " was of the middle size, of a broad square make, which seemed to indicate a more robust constitution than he really had. He was all his life subject to headaches, which, on many occasions, interrupted his studies. His features were exceedingly regular; his complexion somewhat dark; his eyes had more expression than those of any person I ever remember to have seen."

Beattie's Philological and Critical Essays are the most pleasing of his prose works. As a critic, he has been preferred to Blair, by the poet Cowper. Without the severe and chaste dignity of Blair's prose, he is more animated, more diffusive and unequal, more illustrative and more entertaining. His constitution as a poet spoilt him for a metaphysician, and his moral philosophy did no good to his poetry. In his *Essay on Truth*, he rails at the sceptics in rhapsodies and apostrophes, as if he could exorcise the hard-hearted spirits of metaphysics by anathemas, or untie the knot of paradoxes by cursing the hand which had tied them. On the other hand, he loads the beautiful poem of *The Minstrel*, with explanations on free will and providence. A shepherd's son, and a mountain minstrel, listens to the hermit's discourses, as if he were training for a chair of moral philosophy; and comes to have his doubts cleared up, upon the moral disorder of the world, at a time of life when the genuine minstrel is more apt to be troubled with doubts about the fidelity of his mistress. If the character of Edwin was too refined and elevated to be displayed in the tender passion, he might have discoursed with the hermit on subjects more congenial to the poetical character than these sombre discussions.

The true character of poetical genius is in love with the wild and the wonderful; it has nothing to do with abstract views of nature, or moral actions; it believes and enjoys implicitly, and delights neither in creating nor resolving doubts. The actual enjoyments of the poet are inimitably pourtrayed in the first part of the Minstrel; in the second part we leave him to the study of ethics, with as little interest as if he were discoursing with Adam Smith on the wealth of nations, or with Malthus on the checks to population. Yet the moral tenets in the second part, though inaptly placed, are elegantly delivered. The first part of the Minstrel is a gem of the purest water; Edwin's character is a most interesting portrait of moral beauty, supported without the aid of drama, dialogue, or action; yet as finished, distinct, and original, as a dramatic or epic action could have made it. It is wonderful, at the end of sixty stanzas, to find what a new, yet recognizable being we have been made acquainted with,—a being so unlike the world, and yet so natural. The writer who described Edwin might well felicitate himself, in the words of the French poet:

> *——heureux le genie*
> *Qui————*
> *Sans masque sans cothurne et sans illusion,*
> *D'un style simple et vrai fait parler la raison!*
> *Il n'entend pas pour lui retentis la théâtre*
> *Des suffrages bruyants d'une foule idolatre;*
> *Mais le sage le lit. Le sage quelquefois*
> *Pour rever avec lui, s'enfonce dans les bois*
> *Et, charmé de ses vers, n'en suspend la lecture*
> *Que pour voir les foréts, les cieux et la nature.*
> De Lille sur l'Imagination.

The particular and minute beauties of this popular poem we need not trouble our readers with pointing out. Its general characteristic merits are an unaffected elevation and sweetness of sentiment, terse and comprehensive description of rural scenery, and a style of pure and transparent simplicity. The beauty of external nature was never more finely worshipped than in the conclusion of the ninth stanza, which Gray so truly pronounced to be inspired: "Oh! how canst thou renounce, and hope to be forgiven." Dr Aikin, with his usual coldness as a critic, has objected to the fairy vision of Edwin as too splendid and artificial for the fancy of an untutored youth. This is a most absurd objection. If we suppose Edwin to have lived in minstrel days, untutored as he was, he must have heard the ballads of his country; and in these there is sufficient mention of all the materials which constitute his dream. The description of Edwin's walks, and of the hermit's valley in the second book, are perhaps the very finest poetical paintings of landscape which our language possesses.

(4)

BEAUMARIS, or Beaumarsh, the principal town of the isle of Anglesea, in South Wales, is situated at the north entrance of the Menai strait, which forms here a spacious bay. The town, which is extremely neat, has two large streets, which contain 267 houses, a handsome church adorned with a lofty square tower, and an elegant and commodious town hall. A free grammar school, and eight almshouses, evince the charitable disposition of the inhabitants. But the most remarkable object at Beaumaris is its castle, to which the town originally owed all its importance, and probably its existence. When Edward I. had subjugated Wales, he found it necessary to erect fortresses in different places, to overawe the inhabitants, whose spirit, still unbroken and extremely impatient of the yoke, panted for an opportunity of regaining their independence. Magnificent castles had already been reared in Caernarvon and Conway; and the insular situation of Anglesea rendered it still more necessary to have it commanded by a fort and an English garrison. Accordingly, in the year 1275, the foundation of a castle was laid in a place called Bonover Marsh, which afterwards received the French appellation *Beaumarais*, or beautiful marsh. Its situation enabled the engineers to surround this castle with a ditch, which might constantly be filled with water from the bay; and to cut between the river and the castle a canal by which small vessels might convey their cargoes up to the very walls. When this castle was completed, it was garrisoned by twenty-four soldiers, and entrusted to a governor, who was also made general of the town. As this fortress became extremely oppressive to the town, many contentions arose, and several bloody encounters took place between the inhabitants of the town and the soldiers. One of these encounters called the black-fray, which happened in the reign of Henry VI. was attended with great slaughter. The insolence both of the governors and the soldiers in all these Welsh garrisons, was indeed intolerable. Their general object was to exclude the native inhabitants from the towns dependent on their fortresses and so far had they succeeded in Anglesea, that in rental of the borough property of Beaumaris, taken so late as 1608, there appear only seven Welsh names and one burgage in the tenure of a Welshman. the turbulent reign of Charles I., the gentlemen Beaumaris and Anglesea, animated with the warmest loyalty, determined to oppose the parliamentary forces which had assembled at Conway, and had deputed five commissioners to manage their business. But their loyalty was of no avail against the superior discipline and courage of their antagonists. They were routed and dispersed in every direction; and on the 2d of October 1648, the town and castle surrendered to general Mytton, and the inhabitants came under an obligation to pay to their conquerors the sum seven thousand pounds within fourteen days. The castle, which is now the property of the crown stands on the grounds of lord Bulkely. It is attached to the east end of the town, and covers a considerable space of ground. Part of it lies in ruins but its outer walls, several towers, and many other parts, still remain to mark out its dimensions, and shew the style of its architecture.

Beaumaris cannot boast of great antiquity. Before the erection of the castle, it seems to have been an obscure, insignificant place. Edward I. surrounded it with a wall, made it a corporation, and endowed it with some privileges. Since the time of Edward VI., it has regularly been represented by one member in parliament, the right of electing whom is vested in the mayor, bailiffs, and capital burgesses only amounting to twenty-four in number. This is th

ı Wales where the right of election is
he corporation. The government of the
ısted to the mayor, two bailiffs, and the
sses, whose number is limited to twenty-
number of ordinary burgesses no limits
ıumaris is distant 254¾ miles N. W. from
opulation 1576. N. Lat. 53° 14′, W.
′.

of Beaumaris is a very fine bason, in
can ride safely at anchor, in six or seven
r, even at ebb tide. Between Aber and
he distance is four miles broad, though
w water, fills a channel of not more than
he remainder is one bed of sand; and the
trees, found at a considerable distance
sent shores, sufficiently prove that the
made great encroachments, and that these
rmerly soil quite free from water. See
s *Tour in Wales*. Bingley's *Tour round*
. (μ)

E, the second town in the department of
Or, situated at the foot of a hill on the
oise. The town, which is of an oval
ınds on calcareous ground, has handsome
ide streets, and is well situated for inland
new gate is a specimen of good archi-
he church of St Peter is a handsome
ut the most beautiful and magnificent
e hospital, which was founded in 1443
Rollin, chancellor to Philip duke of Bur-
e castle of Beaune is now in ruins. An
ıe curious quarrel between the inhabitants
and the celebrated wit Piron, will be
llin's *Travels through the Southern De-*
f France in 1804 and 1805, chap. x.
344. (*j*)

OBRE, ISAAC DE, an eminent French
vine, was born at Niort in Swisserland,
f March 1659. Little is known of his
ut that they were originally from Pro-
ad taken refuge in Swisserland from the
St Bartholomew. From his tenderest
bre displayed a magnanimous superiority
gs of avarice and ambition. He might
upon life with the fairest prospects of opu-
nours; for a cousin-german of his father,
arly related to Madame de Maintenon,
ed him to study law, that he might present
ady, and thus ensure his future fortune.
re, who had still more exalted views, re-
solicitations, and resolved to devote him-
cred ministry. After studying divinity
e of Saumur, he was ordained at the age
and appointed to the charge of a protes-
ation in some part of France. He had
ve three years in that office, when a vio-
ion arose against the protestants, and his
rdered to be shut up. With a zeal, na-
ge, but extremely imprudent, he opposed
the court, and broke the royal seal,
een affixed to the door of his church.
mned to make *amende honorable* for this
as forced to conceal himself, till he had
ty of leaving France.

tention was to seek an asylum in England, but particular circumstances afterwards determined him to go to Holland. There he became known to the Princess of Orange, who could well appreciate his merits, and thought herself fortunate in getting him appointed chaplain to her daughter, the Princess of Anhalt Dessau. In this capacity he repaired to Dessau in 1686. The happiness which he enjoyed in this retreat, made him ample amends for the loss of his country. The Princess of Anhalt, a lady of great accomplishments, honoured him with the fullest confidence; and he was enabled to pursue his studies without disquiet or interruption. It was here he published his first work, entitled, *A Defence of the Doctrine of the Reformed*, occasioned by the circumstance of a prince of the house of Saxony having changed his religion. It was printed at Magdeburg in 1693, and though the typography was extremely bad and incorrect, the book was very favourably received.

Beausobre.

Next year, (1694,) he was induced, by the advantages which the French refugees enjoyed in Brandenburg, and the facilities which Berlin afforded for study, and for the education of a family, to repair to that city, in which he continued to reside during the remainder of his life. At first he was enrolled among the number of ordinary pastors, who ministered in the parishes granted by the court to the refugees. But his talents soon raised him to higher employments. He was made chaplain to their majesties, counsellor of the royal consistory, director of the French house, inspector of the French college; and, a year before his death, was appointed superintendant of the French churches in Berlin, and of the towns comprehended in that diocese. While he discharged with the highest honour to himself the duties of these several offices, he at the same time pursued his studies with unwearied assiduity. The first work which he undertook, was a *History of the Reformation*, which occupied him for upwards of forty years. He left it in manuscript ready for the press, and it was published at Berlin in 1784 and 1785. This work, of which the principal object is to trace the origin and progress of Lutheranism, contains some very curious details relative to the diffusion of protestant principles in France and Swisserland, and the characters and writings of those who were most active in opposing or defending the reformed religion. He was employed, along with his colleague L'Enfant, by the court of Berlin, in translating the New Testament into French. St Paul's Epistles fell to the share of Beausobre, and the work, which was published in 1718, with an ample preface and notes, was very favourably received. He was one of the principal members of the Anonymous Society in Berlin, and had the direction of the *Bibliotheque Germanique* till his death. To that journal he contributed several papers. While engaged in composing the *History of the Reformation*, he was led into a digression on the *History of Mancheus and Manicheism*, which, swelling far beyond the bounds within which he originally intended to confine it, was published as a separate work in two volumes 4to. This is by far the most elaborate and esteemed of his writings; and has drawn forth the warm commendations of Gibbon and Lardner, who were of all men the best qualified to judge of its merits.

No man ever possessed a happier combination of the talents necessary to a preacher than Beausobre. His sermons were distinguished by a fire of imagination, a richness and elegance of diction, an originality of thought even on the most common topics, and a felicity of illustration, which have seldom been surpassed. His elocution, naturally easy and graceful, was aided by the advantages of a most engaging countenance, a noble figure, and a graceful air. And his instructions, flowing warm from his heart, were recommended and enforced by the bright example of a life actively employed in the exercise of every Christian virtue. He died on the 5th of June 1738, at the age of eighty years; retaining to the last the possession of his faculties, and the full relish of life. See *Memoire sur la Vie de Beausobre*, prefixed to the 2d vol. of his *Hist. du Manicheism.* (*k*)

BEAUTY, in its most general sense, denotes, any quality, or assemblage of qualities, in objects, which are calculated to excite in the observer, emotions of delight and complacency. In a more limited and appropriate sense, beauty is restricted to those qualities of objects which excite in the mind a species of tenderness, fondness, or affection. The great latitude with which the term has been employed, involves the analysis of the beautiful in a considerable degree of difficulty and obscurity. Thus we not only speak of a beautiful woman, and a beautiful flower, in which cases we employ the term in its most appropriate sense; but we speak also of a beautiful building, a beautiful piece of music, a beautiful poem, a beautiful machine, a beautiful theorem in geometry, or a beautiful trait of human conduct; examples of excellence involving qualities of extremely different kinds. A similar ambiguity exists in the terms significant of beauty in every known language. In Greek το καλον, or the epithet *beautiful*, was as frequently applied to moral excellence as to the merely pleasing in objects; and in Latin, *pulchrum* had the same ambiguity, as we learn from its being so commonly conjoined with *honestum*.

In the observations which are to follow on this subject, we shall first inquire into the nature of these qualities which constitute beauty strictly so called; and then we may perhaps be able to ascertain the origin of that analogical application of the term, by which it is made to characterise a class of objects so extremely different from each other as those to which it is applied in the vague and ordinary usage of language. Beauty, strictly so called, we have said, denotes those qualities of objects which excite in the mind a species of affection or tenderness. Even in this limited sense of the word, it comprehends qualities which are exceedingly various and diversified. There is not only a beauty of forms and of colours, but there is a beauty of motions, and a beauty of sounds. There is a beauty too, it may be said, though doubtless of a more debased and sensual kind, which is addressed to the smell, the taste, and the touch. And there is not only a physical beauty, or a beauty in the qualities of material objects, but there is a moral beauty; a beauty in the sentiments and dispositions of the human mind, by which affection is more powerfull roused than by any combination of merely physic properties.

Much ingenuity has been exercised in the attemp to determine in what all these various qualities agre or to assign the true *theory of the beautiful*; a subject no doubt of considerable curiosity and interest The ancients, indeed, have left us very little explici on the philosophy of beauty. Plato has two dia logues on the beautiful; but in neither of them doe he attempt to explain in what it consists, unless b mentioning in general, symmetry and proportion a its constituent qualities. Cicero, in the same indefinite manner, speaks of order and correspondence o parts as qualities of beautiful objects; but he gives no illustration of his doctrine, nor does he represent it as by any means complete.

Before descending to the systems of the moderns, we may mention the theory of the venerable father Augustine, who, in the fourth book of his Confessions, speaks of two or three treatises which he had written, in his younger days, concerning beauty; but some way or other he had lost them, and he doe not appear anxious that they should ever be re covered. According to his view of the subject which may be collected from other parts of his wri tings, beauty consists in unity of parts, or in perfec symmetry.* "And," adds the father, "because a bodies upon earth are made of various elements, w are not here to look for perfect beauty, which is to found alone in the one all perfect Supreme Bein But surely a rose has much less unity of parts than ground worm; although the former is beautiful, t latter altogether disgusting."

The theory which resolves beauty into a certa symmetry and determinate proportion of parts, an which seems to have been that entertained by th Greek and Roman philosophers, has had many stre nuous advocates among the moderns, particularly the class of artists, who seem to have thought th the constituent elements of the beautiful might b with certainty detected, and even measured in t most approved models of statuary and painting. Th insufficiency of this theory has been very satisfactor ly proved by Mr Burke, who is very decidedly opinion, that "beauty is no idea belonging to me suration; nor has it any thing to do with calculatio and geometry." To establish this opinion, he e mines beauty, as it appears in vegetables, in the i ferior animals, and in man; and in all these cases finds that there are no certain measures on which th beautiful can be said, in any degree, to depend.

In the vegetable creation, we find nothing so bea tiful as flowers; but flowers are almost of every of shape and arrangement; and are turned and fa shioned into an infinite variety of forms. What pr portion do we discover between the stalks and th leaves of flowers, or between the leaves and the pi tils? How does the slender stalk of the rose ag with the bulky head under which it bends? T flower of the apple, on the other hand, is very and grows upon a large tree; yet the rose and t apple blossom are both beautiful, and the plants th

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* *Omnis porro pulchritudinis forma unitas est.*

are most engagingly attired, notwithstand-
sproportion: What, by general consent,
to be a more beautiful object than an
, flourishing at once with its leaves, its
and its fruit? but it is in vain that we
any proportion between the height, the
any thing else concerning the dimensions
le, or concerning the relation of the par-
s to each other.

portion has but a small share in the for-
beauty, is fully as evident among animals.
reatest variety of shapes, and dispropor-
arts, are well fitted to excite this idea.
n," remarks Mr Burke, "confessedly a
ird, has a neck longer than the rest of his
but a very short tail: is this a beautiful
? we must allow that it is. But then what
to the peacock, who has comparatively
neck, and a tail longer than the neck and
the body taken together? Turn next to
mine the head of a beautiful horse; find
rtion that bears to the rest of his body,
limbs; and what relations these have to
; and when you have settled these propor-
standard of beauty, then take a dog or
other animal, and examine how far the
rtions between the heads and their neck,
ose and the body, and so on, are found to
ink we may safely say, that they differ in
es; yet that there are individuals found in
ny species so differing, that have a very
auty. Now, if it is to be allowed," adds
, "that very different, and even contrary,
dispositions are consistent with beauty, it
believe, to a concession, that no certain
perating from a natural principle, are ne-
produce it, at least so far as the brute
e concerned." *Sublime and Beautiful*,
ect. 3.

a that the beauty of the human species de-
certain determinate proportions has been
far, that artists will tell us how many
o the length of the body, how many wrists
k, or how many noses to the face. But
ty that takes place in their various esti-
iciently shews the fallacy of their doctrine.
a well proportioned body to be seven
ne make it eight, while others extend it
. If we examine the master pieces of an-
nodern statuary, we shall find them for the
differing from these established rules, and
one another in the proportions of their
ile they differ no less from the propor-
we find in living men, of forms extremely
d agreeable. "The Hercules, by Glicon,"
ogarth, "hath all its parts finely fitted for
es of the utmost strength the texture of the
re will bear; the back, breast, and shoul-
huge bones, and muscles adequate to the
ctive strength of its upper parts; but as
th was required for the lower parts, the
culptor, contrary to all modern rule of en-
ry part in proportion, lessened the size of
s gradually down towards the feet; and,
e reason, made the neck larger in circumference than any part of the head; otherwise the figure would have been burdened with an unnecessary weight, which would have been a drawback from his strength, and, in consequence of that, from its characteristic beauty. These seeming faults, which shew the superior anatomical knowledge as well as judgment of the ancients, are not to be found in the leaden imitations of it near Hyde Park. These saturnine geniuses imagined they knew how to correct such apparent *disproportions*." *Analysis of Beauty*, chap. ii.

The doctrine that beauty consists in determinate proportions, seems to have been derived from architecture; it being found that dwellings are most commodious and firm, when thrown into regular figures, with parts answerable to each other. This idea was transferred to our old-fashioned gardens, where trees were turned into pillars, pyramids, and obelisks; hedges were formed into so many green walls, and walks fashioned into squares, triangles, and other mathematical figures, with the utmost exactness and symmetry. And thus it was thought, that if we were not imitating, we were at least improving nature, and teaching her to know her business. But nature has at last escaped from these fetters; and our gardens, if nothing else, declare our conviction, that mathematical ideas are not the true measures of beauty. Even in architecture it is not any determinate principles of proportion, so much as the notion of stability and commodiousness, and of the adaptation of the means to the proposed end, that fixes the form and measures of any particular building. Thus there is one proportion of a tower, another of a house, one proportion of a gallery, another of a hall, another of a chamber; and to judge of the proportions of each, we must first be acquainted with the purposes for which they were designed.

This leads us to notice that theory of the beautiful, which resolves it into the perception of utility, or of an object being well adapted to answer the particular end for which it was intended; a doctrine which has had no less general an extent than the theory of proportion. Utility, or fitness for some important purpose, is doubtless a quality in things which we always contemplate with complacency and approbation; but it is a quality which may very readily be discriminated from beauty. On this principle, as Mr Burke remarks, "the wedge-like snout of a swine, with its tough cartilage at the end, the little sunk eyes, and the whole make of the head, so well adapted to its offices of digging and rooting, would be extremely beautiful. The great bag hanging to the bill of a pelican, a thing highly useful to this animal, would be likewise as beautiful in our eyes. The hedgehog, so well secured against all assaults by his prickly hide, and the porcupine with his missile quills, would be then considered as creatures of no small elegance. There are few animals," adds he, "whose parts are better contrived than those of a monkey; he has the hands of a man, joined to the springy limbs of a beast; he is admirably calculated for running, leaping, grappling, and climbing; and yet there are few animals which seem to have less beauty in the eyes of all mankind. I need say little of the trunk of the elephant, of such various usefulness, and which is so far from contributing to his beauty. How well fitted is the wolf for running and leaping! how admirably is the lion armed for battle! but will any one, therefore, call the elephant, the wolf, and the lion, beautiful animals? I believe nobody will think the form of a man's legs so well adapted to running as those of a horse, a dog, a deer, and several other creatures; at least they have not that appearance: yet, I believe, a well-fashioned human leg will be allowed far to exceed all these in beauty." Part iii. sect. 7.

Again, if, in our own species, beauty were annexed only to usefulness, men would be considered as much more lovely than women; and strength and agility would be considered as the only beauties. The stomach, the lungs, the liver, as well as many other parts of the body, are incomparably well adapted to their purposes: yet they are far from having any beauty. A plough is a highly useful machine, and excellently adapted to its end; yet we by no means consider it as beautiful; while this term may be properly applied to some insignificant trinket of no value at all. When we examine the structure of a watch, and even come to know thoroughly the use of all its parts, we may indeed admit the fitness of the whole; but are far enough from perceiving any thing like beauty in the work; but if its case be curiously chased and engraved, it will excite in us a very lively idea of beauty, although this kind of ornament is not of the smallest use. It is plain, then, that it is not utility, or the fitness of an object to produce some important end, that constitutes beauty.

Somewhat allied to the theories already mentioned, is that which ascribes beauty to *perfection* in a particular kind or species; or to the exact conformity of an object to the generally prevailing character of the co-related objects. This theory has been adopted and illustrated by the learned and ingenious Father Baffier. It is supposed to explain, why, in Africa, a black complexion, woolly hair, a flat nose, and thick lips, are esteemed beauties, while their opposites only are admired in Europe: And it professes to determine what is justly considered as a desideratum, the *standard* of beauty; which, according to this theory, is that which is most common to all the individuals of a species; and of which, though the whole parts may not be found in any one individual, yet something may be contributed by them all. Specious, however, as this theory seems to be, it will by no means apply in a multiplicity of instances; for numberless beautiful objects are to be found, which deviate very widely from the common standard of their species. The most common, or standard forms, of any species, are those which are viewed, perhaps, with the greatest indifference, being possessed of no other quality than mediocrity, which is as remote from beauty, on the one hand, as it is from deformity on the other.

"So far is perfection, considered as such, from being the cause of beauty," remarks Mr Burke, "that this quality, where it is highest in the female sex, almost always carries with it an idea of weakness and imperfection. Women are very sensible of this; for which reason they learn to lisp, to totter in their walk, to counterfeit weakness, and even sickness. In all this they are guided by nature. Beauty in distress is much the most affecting beauty. Blu ing has little less power; and modesty in gener which is a tacit allowance of imperfection, is its considered as an amiable quality, and certainly heig tens every other that is so. I know it is in eve body's mouth, that we ought to love perfecti This is to me a sufficient proof, that it is not t proper object of love. Who ever said, we *oug* to love a fine woman, or even any of those beauti animals which please us? Here to be affected th is no need of the concurrence of our will." Part sect. 10.

The celebrated Dr Hutcheson of Glasgow pro sed a theory of beauty, which was greatly admi in its time, and likewise, for a while, very genera adopted. According to this theory, beauty consi in a certain determinate combination of variety parts, with uniformity of structure. This syste which is sustained by all the formality of mathen tical demonstration, lays it down, that of two giv bodies, if the number of parts be the same, the bea ty will be as the uniformity of structure; if t uniformity be the same, the beauty will be as the riety of parts; if neither be the same, the beauty w be in the compound ratio of the variety and unif mity. Thus, an equilateral triangle is more beauti than one with unequal sides, because, with the sa number of parts, it possesses more uniformity structure. A square is more beautiful than an equ lateral triangle, because, with the same uniformity structure, it possesses a greater variety of parts. A ellipsis nearly equals the beauty of a circle, becaus with less uniformity of structure, it has greater v riety of parts; and so forth.

"The beauty of an equilateral triangle," says D Hutcheson, "is less than that of a square, which i less than that of a pentagon, and this again is su passed by the hexagon. When, indeed, the numbe of the sides is much increased, the proportion of the to the radius, or diameter of the figure, is so much lost to our observation, that the beauty does not al ways increase with the number of sides; and th want of parallelism, in the sides of heptagons, an other figures of odd numbers, may also diminish the beauty. So in solids, the eicosiedron surpasses th octaedron, which is still more beautiful than the cub and this again surpasses the regular pyramid; th obvious ground of this is greater *variety* with equ *uniformity*."—"Instances of the compound ratio w have, in comparing circles or spheres with ellipses o spheroids, not very eccentric; and in comparing th compound solids, the exoctaedron, and eicosidode caedron, with the perfectly regular ones of whic they are compounded; and we shall find, that th want of that most perfect *uniformity* observable the latter, is compensated by the greater *variety* the others, so that the *beauty* is nearly equal." *In quiry concerning Beauty, Order, &c.* p. 16.

This theory may have some plausibility when ap plied to works of art; but it is altogether defecti when applied to the beauties of nature. Dr Hutcheso indeed, illustrates his doctrine by examples, deduce not only from artificial figures, but from the outwar form and inward structure of animals; from the pro portion of their parts to each other; from the har evinced by this, that their proportions and relations to one another admit of being accurately ascertained, and even mathematically demonstrated. A melodious tone is naturally pleasing in itself, and a regular succession of such tones, in a certain proportion to each other, both in respect of their duration and of their musical pitch, is naturally pleasing to all classes of mankind. In so far, therefore, music is beautiful in itself; but even in the case of music, no small share of our gratification is to be ascribed to its expression, or to the feelings which are associated with the particular composition. To the time of music, as quick or slow, we associate the ideas of cheerfulness or melancholy; and to any succession of notes intended to be imitative of certain sounds in nature, we associate the expression connected with those sounds. All music which is passionate, or indicative of any emotion, can be so only in consequence of the effect of association; and vocal music, which is avowedly the most powerful in its effects, brings to its assistance all the charms and pathos of poetry. Were the effects of music purely mechanical, and unaided by occasional association, a piece of music ought to produce precisely the same effect upon all descriptions of people, and upon all occasions, which is confessedly contrary to experience.

But again, in the scenes of nature, there are many sounds which are productive of the emotion arising from beauty, in consequence alone of the pleasing associations with which they are connected; such as the sound of the waterfall, the murmuring of the rivulet, the whispering of the wind, the sheep-fold bell, the toll of the curfew, &c. And that these sounds are beautiful only in consequence of the emotions which are associated with them, may be inferred from the insignificancy of the sounds themselves; from their being perfectly indifferent to the vulgar, who have no such associations; and even to ourselves, unless when they suit the general character of the scene, or the particular train of mind in which we may happen to be. The same remarks are applicable to the notes of animals, commonly allowed to be beautiful; although, in the case of singing birds, allowance must be made for the musical melody which nature has bestowed upon that class of her creatures. The bleating of the lamb, the lowing of the cow, the call of the goat, the hum of the beetle, or the twitter of the swallow, will all occasionally be listened to with delight, but surely not in consequence of any inherent beauty which they possess. "A peasant would laugh," says Mr Alison, "if he were asked, if the call of a goat, or the bleating of a sheep, or the lowing of a cow, were beautiful; yet in certain situations, all of these are undoubtedly so. A child shews no symptom of admiration at those sounds which are most affecting in natural scenery to other people. Every one will recollect, in what total indifference his early years were passed, to that multitude of beautiful sounds which occur in the country; and I believe, if we attend to it sufficiently, it will be found, that the period when we became sensible to their beauty, was, when we first began to feel them as expressive, either from our own observation of nature, or from the perusal of books of poetry. In the same manner, they who travel into very distant countries, are at first insensible to the beauty which the natives of these countries ascribe to the notes of the animals belonging to them, obviously from their not having yet acquired the associations which are the foundation of their beauty. The notes which are sacred from any kind of superstition, are beautiful only to those who are under the dominion of that superstition. A foreigner does not distinguish any beauty in the note of a stork. To the Hollander, however, to whom that bird is the object of a very popular and very pleasing superstition, this note is singularly beautiful." *Essay* ii. ch. ii. Sect 1. p. 1.

Colour has always been admitted as a copious source of beauty, and no doubt part of its effect is to be ascribed to the mechanical constitution of the human body, in consequence of which, certain colours naturally excite a pleasing sensation, while others are disagreeable, and even painful. Thus green, blue, and the middle tints of the rainbow, are refreshing and agreeable to the sight; and on that account are always esteemed beautiful. But by far the greatest effect of colour, considered as an object of beauty, is shewn by Mr Alison to arise from the imagery with which it is associated in our minds; and the pleasing and affecting qualities of which it is expressive. The associations with which colours are connected, are reduced by this author under the three following heads: 1. Such as arise from the nature of the objects thus permanently coloured. 2dly, Such as arise from some analogy between certain colours, and certain dispositions of mind; and, 3dly, Such as arise from accidental connections, whether national or particular.

The following are examples of the first kind of association: White, as it is the colour of day, is expressive to us of the cheerfulness or gaiety which the return of day brings. Black, as the colour of darkness, is expressive of gloom and melancholy. The colour of the heavens, in serene weather, is blue: blue, therefore, is expressive to us of something of the same pleasing and temperate character. Green is the colour of the earth, in spring: it is consequently expressive to us of some of those delightful images which we associate with that season. The colours of vegetables and minerals acquire, in the same manner, a kind of character from the character of the species which they distinguish. The expression of those colours, which are the signs of particular passions in the human countenance, and which from this connection, derive their effect, every one is acquainted with.

Again, there are many colours which derive expression from some analogy between them and certain affections of the mind; on which account, they obtain the names of soft or strong, mild or bold, gay or gloomy, cheerful or solemn, &c. And, lastly, there are many colours which acquire character merely from accidental association. Thus purple has acquired a character of dignity, from its accidental connection with the dress of kings. Black in this country, indicates gravity; and scarlet is connected with military ideas. In other countries, the same colours are expressive of very different character, because of different associations. Thus in China, white is gloomy, because the colour allotted to mourning; and yellow is the most dignified colour,

is that allotted to the royal family. In
Venice, on the contrary, black is a lively
ause it is this that distinguishes the dress
at. All this serves very plainly to shew,
aracter of colour depends more upon the
th which it is associated, than upon any
ent in its own nature.
beauty of colour is to be ascribed to ex-
arther appears from this, that those co-
, in general, we call beautiful, cease to be
ssociated with mean ideas; and that the
rent colours become beautiful, in conse-
lignified associations. The colours which
the dress of the common people are never
as beautiful, although often the most
the rainbow; while those which are worn
and the fashionable, become immediately
hatever may be the disagreeable associa-
which they are more directly connected.
man," says Mr Alison, "would scarcely
at the colours of a glass bottle, of a dead
y, &c. could ever be beautiful; yet with-
w years, not only these, but some much
easant colours that might be mentioned,
fashionable and admired. As soon, how-
e fashion changes, as soon as they whose
complishments give this fictitious value to
they wear, think proper to desert them,
beauty of the colour is at an end." (*Es-*
ii. sect. 2.) In the same manner, the co-
mmon implements, or pieces of furniture,
dmired; while those of mahogany, cedar,
, &c. although far from naturally plea-
on account of the costliness of the mate-
rred by us to the most brilliant colours
these valuable woods could be painted.
e now to the beauty of *forms*, the most
ranch of the subject, and that on which
has exhibited the greatest portion of ori-
d ingenuity. It seems to have been im-
umed by all preceding inquirers into the
tics of beauty, that some forms were es-
nd, by their very nature, more beautiful
; hence the ideal line of beauty and of
e serpentine, and gradually curling outline
arth and his followers. Mr Alison seems
to have proved, that forms are beautiful,
nsequence of association, and of the qua-
hich they are expressive; that all forms
ul which are expressive of *delicacy* or *ten-*
hat the *angular* form, when it has this
is reckoned as beautiful as the curvili-
that the *curvilinear*, when it is deprived
ression, ceases any longer to be beautiful.
se of the general prejudice in favour of
g line, as constituting the true line of
thus satisfactorily explained by Mr Ali-
e greater part of those bodies in nature,
sess hardness, strength, or durability, are
ed by angular forms. The greater part
bodies, on the contrary, which possess
fragility, or delicacy, are distinguished
g or curvilinear forms. In the mineral
all rocks, stones, and metals, the hardest
urable bodies we know, assume universal-
ly angular forms. In the vegetable kingdom, all strong and durable plants are in general distinguished by similar forms. The feebler and more delicate race of vegetables, on the contrary, are mostly distinguished by winding forms. In the animal kingdom, in the same manner, strong and powerful animals are generally characterised by angular forms: feeble and delicate animals, by forms of the contrary kind. In consequence of this very general connection in nature, these different forms become expressive to us of the different qualities of strength and delicacy. In all those bodies which have a progress, or which grow and decay within our own observation, the same character of form is observable. In the vegetable kingdom, the infancy or youth of plants is in general distinguished by winding forms. The infancy and youth of animals is, in the same manner, distinguished by winding or serpentine forms. Their mature and perfect age, by forms more direct and angular. In consequence of this connection, forms of the first kind become in such cases expressive to us of infancy, and tenderness, and delicacy; and those of the second kind of maturity, and strength, and vigour. Besides these very obvious associations, it is also to be observed, that, from the sense of touch, angular forms are expressive to us of roughness, sharpness, harshness; winding forms, on the contrary, of softness, smoothness, delicacy, and fineness; and this connection is so permanent, that we immediately infer the existence of these qualities when the bodies are only perceived by the eye. There is a very strong analogy between such qualities as are perceived by the sense of touch, and certain qualities of mind, as in all languages such qualities are expressed by terms drawn from the perceptions of the external sense. Such forms, therefore, when presented to the eye, not only lead us to infer those material qualities which are perceived by the sense of touch, but, along with these, to infer also those qualities of mind, which, from analogy, are signified by such qualities of matter; and to feel from them some degree of that emotion which these dispositions of mind themselves are fitted to produce." *Essay* ii. ch. iv. sect. 1. part 2.

That it is only in consequence of the expression of delicacy, that the winding form is esteemed beautiful, may be inferred from this, that when this expression or association is destroyed, the form immediately loses its beauty. It is possible, by mechanical means, to bend bars of metal into waving lines; but the effect is far from pleasing, because instead of delicacy, it becomes expressive of force and constraint; and if in any case such forms exhibited in metal are pleasing, it is when the material is brought to a very fine texture, as in the imitation of delicate shrubs; or when the workmanship is so exquisite, as to bestow on the subject a character of delicacy, which does not properly belong to it. Neither is the crooked or curvilinear form pleasing in the stems or branches of trees, or in the more robust plants; because here, instead of being expressive o. ease, it rather denotes force and constraint.

But again, angular forms themselves are beautiful, when expressive of fineness, tenderness, or delicacy. "The myrtle, for instance," says Mr Alison, "is generally reckoned a beautiful form, yet the growth of its stem is perpendicular, the junctions of its branches form regular and similar angles, and their direction is in straight or angular lines. The known delicacy, however, and tenderness of the vegetable, at least in this climate, prevails over the general expression of the form, and gives it the same beauty which we generally find in forms of a contrary kind. How much more beautiful is the rose tree when its buds begin to blow, than afterwards when its flowers are full, and in their greatest perfection: yet in this first situation, its form has much less winding surface, and is much more composed of straight lines and of angles, than afterwards, when the weight of the flower weighs down the feeble branches, and describes the easiest and most varied curves. The circumstance of its youth, a circumstance in all cases so affecting; the delicacy of its blossom, so well expressed by the care which Nature has taken in surrounding the opening bud with leaves, prevail so much upon our imagination, that we behold the form itself with more delight in this situation, than afterwards, when it assumes the more general form of delicacy. It is on a similar account, that the leaves of vegetables form a very common and a very beautiful decoration, though they are less distinguished by winding lines, than almost any other part of the plants. There are an infinite number of the feebler vegetables, and many of the common grasses, the forms of which are altogether distinguished by angles and straight lines, and where there is not a single curvature through the whole, yet all of which are beautiful, and of which also some are imitated in different ornamental forms with excellent effect, merely from the fineness and delicacy of their texture, which is so very striking, that they never fail, when we attend to them, to afford us that sentiment of interest and tenderness, which in general we receive from the opposite form. There are few things in the vegetable world more beautiful than the knotted and angular stem of the balsam; merely from its singular transparency, which it is impossible to look at without a strong impression of the fineness and delicacy of the vegetable. Such observations, with regard to flowers or plants, every person has it in his power to pursue. There is not, perhaps, any individual of the vegetable kingdom, which, if it is remarkable for its delicacy or tenderness, is not also considered as beautiful in its form, whether that form be winding or angular."

In many of those arts, where the beauty of form is chiefly consulted, the curvilinear form being less expressive of delicacy than the angular, has no place. In most of the ornamental manufactures of metal, as in that of cut or polished steel, the expression of delicacy requires that the bulk of the material should be as much reduced as possible; and hence the predominence of sharp angles and plane facets. A sword hilt, or a watch chain, are infinitely finer and more beautiful, when they are composed of angular forms, than when they are composed of curves. In the forms which are given to jewels, the same rule universally obtains; the same is true of the manufactures of glass for ornamental purposes. The delicacy of such subjects is in their brilliancy; and the form which displays that quality is the only o that is beautiful in them. In the articles of o household furniture, also, the same regard to ligh ness and delicacy of structure may be traced in m ny of the prevailing angular forms. "Strong a massy furniture," observes Mr Alison, "is ever where vulgar and unpleasing; and though, in point utility, we pardon it in general use, yet wherever w expect elegance or beauty, we naturally look f fineness and delicacy in it. The actual progress taste, in this article, is from strength to delicac The first articles of furniture, in every country, a strong and substantial. As taste improves, and as is found that beauty, as well as utility, may be co sulted in such subjects, their strength and solidit are gradually diminished, until, at last, by succe sive improvement, the progress terminates in th last degree of delicacy, and even of frugality, whic is consistent either with the nature of the workma ship, or the preservation of the subject."

If this doctrine, concerning the beauty of for be just, it should follow, that in those forms, whi are of a very compound nature, the beauty does n arise so much from a certain mixture of variety a uniformity, as from a certain characteristic expre sion belonging to the whole. And this is perfect consistent with the common language of men, wh when describing such complex objects, as a garde or particular scene of nature, uniformly speak o them as *expressive* of greatness, wildness, gaiety, tra quillity, melancholy, or some other affecting qualit With respect to the artificial composition of comple beautiful forms, Mr Alison declares the total insuffi ciency of Mr Hogarth's rule, viz. "To make choi of a variety of lines, and vary their situations wit each other, by all the different ways that can b conceived, and, at the same time, (if a solid figu be the subject of the composition), the contents o space that is to be enclosed within those lines, mus be duly considered, and varied too as much as possi ble with propriety." Instead of this, Mr Aliso proposes, that some characteristic or expressive for should be selected, and that the variations, whethe in the form, number, or the proportion of the parts should be adapted to the peculiar nature of this ex pression, or of that emotion which it is fitted to ex cite in the mind of the spectator. *Essay* ii. ch. iv sect. 1. part 3.

The beauty of motion still remains to be mention ed; and, like the beauty of form, it arises principa ly, or solely, from expression. Slow and gentle mo tion, being indicative of ease and delicacy, is in ge neral the most beautiful; such as the soft gliding o a stream, or the light traces of a summer breeze th on a field of corn. These are beautiful when i straight lines; but still more so, when they describ serpentine or winding lines; because still more indi cative of ease. But though slow motion is, in gene ral, the most beautiful, rapid motion may become s when the bodies moved excite only pleasing or mo derate affections. Thus the quick ascent of fire works, and the rapid shooting of the aurora borealis are extremely beautiful; though the rapid shooting of lightning is too terrific to possess such a character. The motion of the humming-bird, too, though mor hat of the eagle, is considered as beauti- unt of the delicacy of the object moved. then, to be clearly proved by Mr Alison, auty of material objects does not result ermanent qualities in the objects them- from the *expression* of the objects, or, being the signs or expressions of such qua- e fitted by the constitution of our nature *emotion*." The expression that may be generally to prevail in beautiful objects, those that are judged of by the eye, is tleness, delicacy, or tenderness, a quality vell-suited to excite emotion blended with r that kind of love which, according to definition, is the characteristic effect of long with this expression of delicacy, or there may, however, be combined the ex- some other valuable quality, which will approbation and delight, with which we objects merely beautiful; and produce of a more complicated and pleasing kind hich beauty alone excites. Thus beauty combination with *design*, or a skilful com- parts, as in a poem, a painting, a musical , or a machine; and in consequence of ation, our approbation will be enhanced. *of design* is a phrase or expression of ccurrence, and shews the connection be- motions which belong to the perception eral qualities. Another adventitious aid *fitness*, or the proper adaptation of means subservient to which, and also to design, y of *proportion*." In the forms of furni- hines, and instruments in the different arts, part of their beauty arises from the con- f fitness; nor is there any form which does beautiful, in this sense, where it is found tly adapted to its end. "A ship which , and which promises to sail well," says th, "is called by sailors a beauty." nothing more common, in books of ana- atural history," says Mr Alison, "than auty applied to many common, and many parts of the animal frame; nor is there who considers the subjects in the light of alone, who does not feel the same emo- e writers. A physician talks even of a eory of dropsies or fevers, a surgeon of a strument for operations, an anatomist of subject or preparation. These instances t to shew, that even the objects which are ute of natural beauty, become beautiful, re regarded only in the light of their fit- that the reason why they do not always tiful to us, is that we in general leave out of our consideration."

eauty may be combined with *utility*, as it in almost all the productions of nature; combination, the delight with which we an object, is in the highest degree en- n the superiority, in this respect, of the ture over those of mere art, there is a fine by Mr Hogarth. "Here, I think," genious artist, "will be the proper place to speak of a most curious difference between the living machines of nature in respect of fitness, and such poor ones in comparison with them, as men are only capable of making. A clock by the government's order has been made by Mr Harrison, for the keeping of true time at sea, which is, perhaps, one of the most exquisite movements ever made. Happy the ingenious contriver! although the form of the whole, or of every part of this curious machine, should be ever so confused, or displeasingly shaped to the eye, and although even its movements should be disagreeable to look at, provided it answers the end proposed: an ornamental composition was no part of his scheme, otherwise than as a polish might be necessary; if ornaments are required to be added to mend its shape, care must be taken that they are no obstruction to the movement itself, and the more as they would be superfluous as to the main design. But in Nature's machines, how wonderfully do we see beauty and use go hand in hand! Had a machine for this purpose been Nature's work, the whole and every individual part might have had exquisite beauty of form, without danger of destroying the exquisiteness of its motion, even as if ornament had been the sole aim; its movement, too, might have been graceful, without one superfluous tittle added for either of these lovely purposes."

Thus have we endeavoured to ascertain the source of the quality of beauty in the various classes of objects, whether we take the term in its more appropriate, or in its more vague and indeterminate sense, that is, whether it denote a quality exciting a certain degree of affection and love, or a quality exciting only complacency and mental approbation. In both cases, we find beauty to arise, not so much from any determinate properties of matter, as from the expression of the whole, and the emotion which it is calculated to raise. Objects more strictly called beautiful, are generally expressive of delicacy or tenderness; and those which are called beautiful, from analogy, and a certain relation to their objects, are expressive of some valuable property, such as design, fitness, proportion, or utility; which may be called beautiful, even when existing alone, but much more so, when united with real beauty and grace. It remains, before finishing the subject, that we say a few words on the beautiful in human character, or on what is properly termed *intellectual and moral beauty.*

There are many qualities of the mind which are always considered as amiable, and excite affection in those who contemplate them; such are innocence, condescension, humanity, natural affection, and the whole train of the soft and gentle virtues. It is to such qualities that the epithet of the *beautiful in human character* properly belongs; and the analogy between them and the properties in material objects which are justly termed beautiful, is sufficiently apparent, as both are expressive of delicacy or tenderness. There are, on the other hand, certain virtues of the mind that raise admiration rather than affection; and are therefore sublime rather than beautiful; such as magnanimity, fortitude, self-command, superiority to pain and labour, superiority to pleasure, and to the smiles of fortune, as well as her frowns. These awful virtues constitute what is most grand in the human character; the gentle virtues, what is most beautiful and lovely. Thus the qualities of mind are a copious source both of beauty and sublimity:

> " Mind, mind, alone! bear witness, earth and heaven,
> The living fountains in itself contains
> Of beauteous and sublime. Here, hand in hand,
> Sit paramount the Graces. Here, enthroned,
> Celestial Venus with divinest airs,
> Invites the soul to never-fading joy." AKENSIDE.

" Those virtues," says Mr Burke, " which cause admiration, and are of the sublimer kind, produce terror rather than love; such as fortitude, justice, wisdom, and the like. Never was any man amiable by force of these qualities. Those which engage our hearts, which impress us with a sense of loveliness, are the softer virtues; easiness of temper, compassion, kindness, and liberality; though certainly those latter are of less immediate and momentous concern to society, and of less dignity. But it is for that reason that they are so amiable. The great virtues turn principally on dangers, punishments, and troubles, and are exercised rather in preventing the worst mischiefs, than in dispensing favours; and are therefore not lovely, though highly venerable. The subordinate, turn on reliefs, gratifications, and indulgences; and are therefore more lovely, though inferior in dignity. Those persons who creep into the hearts of most people, who are chosen as the companions of their softer hours, and their reliefs from care and anxiety, are never persons of shining qualities, nor strong virtues. It is rather the soft green of the soil on which we rest our eyes when they are fatigued with beholding more glaring objects. It is worth observing how we feel ourselves affected in reading the characters of Cæsar and Cato, as they are so finely drawn and contrasted in Sallust. In one, the *ignoscendo, largiendo;* in the other, *nil largiendo.* In one, the *miseris perfugium;* in the other, *malis perniciem.* In the latter we have much to admire, much to reverence, and perhaps something to fear; we respect him, but we respect him at a distance. The former makes us familiar with him; we love him, and he leads us whether he pleases. To draw things closer to our first and most natural feelings, I will add a remark made upon reading this section by an ingenious friend. The authority of a father, so useful to our well-being, and so justly venerable upon all accounts, hinders us from having that entire love for him that we have for our mothers, where the parental authority is almost melted down into the mother's fondness and indulgence. But we generally have a great love for our grandfathers, in whom this authority is removed a degree from us, and where the weakness of age mellows it into something of a feminine partiality." *Enquiry into the Sublime and Beautiful*, Part iii. Sect. 10.

So powerful is the influence of the beauty of mind upon our affections, and so intimate the connection between that kind of beauty, and the expression which belongs to every beautiful object of the material world, that various writers, both ancient and
modern, have been disposed to affirm, that
derives all its beauty from the expression of c
qualities of *mind*. Such is the doctrine that ap
to have been taught in the Platonic school;
which has been maintained by several writers of
nence in this country, particularly by Lord Sh
bury, Dr Hutcheson, Dr Akenside, Dr Spe
and by Dr Reid, in his Essays on the Intelle
Powers of Man. Mr Alison, although the i
tigations which he has so successfully cond
concerning the real sources of the beautiful, all
to establish the general principle, that beauty i
solvable into expression, is not disposed to giv
unqualified assent to this theory. " If," say
" by this doctrine it is only meant that *matter* i
beautiful in itself, without reference to *mind;*
that its beauty arises from the expressions whic
intelligent mind connects with and perceives in
readily agree to it; and perhaps the preceding
trations may afford it some farther confirmation
pointing out, more minutely than has hitherto
done, some of the principal classes of those ex
sions. But if it is further meant, that *matt*
beautiful only by being expressive of the pr
qualities of *mind;* and that all the beauty of the
terial, as well as of the *intellectual* world, is
found in mind, and its *qualities* alone, there
some reason for hesitation before we admit this
clusion. That the only *subjects* of our know
are matters and mind, cannot be denied; but it
not follow, that all the *qualities* with which we
acquainted, must be the proper qualities eithe
body or of mind. There are a number of qua
which arise from *relation;* from the relation of
ferent bodies or parts of bodies to each other;
the relation of body to mind; and from the rela
of different qualities of mind to each other, that
as much the objects of our knowledge, and
quently the objects of our attention, as any of
proper qualities, either of body or mind. Many q
lities also of this kind are productive of emotion.
stead, therefore, of concluding that the beauty
matter arises from the expression of the qualiti
mind, we shall rest in a more humble, but, as I
prehend, a more definite conclusion. That the b
ty of the qualities of matter arises from their b
the signs or expressions of such qualities as are
by the constitution of our nature to produce e
tion."

Before bringing this article to a close, it may
proper to remark, that the leading principle to w
we have been conducted by the preceding ample
lysis, very nearly coincides with the conclusion
Professor Stewart, respecting the source of our
probation of the beautiful, as given to the world
his late volume of Philosophical Essays. It is
opinion of that philosopher, that the term beau
first of all applied to whatever is naturally plea
or delightful in *colours*, in some of which there i
essential and inherent source of gratification, in c
sequence of their agreeable action on our sen
sight, as we have had occasion to observe ab
From this early and limited application, the epit
beautiful is, he thinks, gradually and metaphorica
extended to indicate whatever is pleasing in exter

her by its inherent qualities, or by the
nfluence of casual association; and in the
plied even to the relations of *fitness, pro-*
utility, the perception of which always
ie operation of the rational faculty.

lently to the *expression* of objects, rather
y precise and regularly recurring peculiari-
ir constitution, that Mr Stewart ascribes
y; as, in the greatest variety of cases, it
nfluence of association alone that he ex-
approbation, and accounts for the delight
we contemplate whatever we consider as
the name of beautiful. See Burke's *Phi-*
Inquiry into the Origin of our Ideas of the
nd Beautiful. Hogarth's *Analysis of*
Hutcheson's *Inquiry concerning Beauty,*
's *Review of the principal Questions in*
Reid's *Essays on the Intellectual Powers*
Sayer's *Disquisitions Metaphysical and*
Alison's *Essays on Taste.* Stewart's
cal Essays. (*m*)

ER, in Zoology, the English name of the
iber of systematic naturalists. The gene-
cific differences of the beaver tribe, and
arities of structure that distinguish the
aver from other quadrupeds, will be given
MMALIA; but in the present article we
describe the manners and habits of this
imal; and, as far as possible, to correct
into which writers have fallen with re-
s economy.

animal have the accounts given by natural-
avellers been more extraordinary, or more
. The beaver has been elevated, in point
t and foresight, to a rank scarcely, if at
r to the human race. It has been de-
raising works, and constructing habita-
ch appear altogether impracticable by an
ose utmost length does not exceed three
e paws are seldom larger than a crown
l whose tail, though broad and flat, has
uch an inclination downwards, that it can
brought on a line with the back. Yet it
asserted that, with such small and unma-
nstruments, these animals are capable of
kes six feet long, and as thick as a man's
feet deep into the ground; of watling
s into a kind of basket work with twigs;
huts consisting of several apartments, and
al floors, the latter being supported on
it in the upright stakes, and of plastering
nd ceilings of these apartments with mud,
rm a smooth and uniform surface. Incre-
iese assertions may appear, they were not
d by testimony; but this testimony seems
en the result of hasty observation, assisted
ve of the marvellous, so natural to a lively
and it has been flatly contradicted by later
f equal credibility, and apparently of more
. Still, however, though we abandon these
le parts of the natural history of the bea-
h remains abundantly to excite our inte-
lmiration.

are found in most of the northern regions of Europe and Asia, and were formerly not uncommon in Britain. At present, they are met with in the greatest numbers in North America, where the hunting these animals, and collecting their furs, form a very important object of commercial traffic. In their natural state, they subsist entirely on vegetable food, such as roots, young wood, and the bark of trees; and as, during summer, these are to be obtained in great abundance, the beavers pass that season in wandering, dispersed about the meadows and thickets that border the lakes and rivers which abound in North America. Here they ramble at their ease, retiring, for occasional shelter or repose, to the covert of bushes; and when any sudden noise indicates the approach of danger, of which they receive notice by proper centinels, they seek a sure retreat in the neighbouring waters.

Beaver.

Towards autumn they quit their roving way of life, form themselves into communities, and, instructed by that admirable instinct, of which we have so many examples in the history of the animal creation, begin to provide for the wants of a season, whose duration and inclemency would effectually preclude a regular supply of their accustomed nourishment. On the approach of winter, those beavers which constitute an established society retire to their old habitations, while such as have formed new colonies set about constructing cabins for themselves.

The winter quarters of the beavers are situated on the bank of a river or a creek, or, where these are not to be found, on the edge of a lake or pond. In selecting the exact spot where they may form their houses, they appear to be guided by two considerations, viz. a sufficient depth of water, to prevent its being completely frozen, and the existence of a current, by means of which they can readily convey wood and bark to their habitations. To prevent the water from being drained off, when the frost has stopped the current towards its source, the beavers construct a dam across the stream; and in this work they certainly display wonderful sagacity, skill, and perseverance. The dam is constructed of drift-wood, branches of willows, birch, poplars, stones, and mud, brought by the beavers in their mouths, or between their paws, and not, as many have asserted, on their tails. These materials are not arranged in any particular order, but are placed indiscriminately in such a manner as to stem the current to the best advantage. If the current be slow, the dam runs straight across; but if the stream be rapid, the dam is formed with a regular curve, having the convexity towards the current, so as effectually to resist the force of the water and ice that rush down during the storms of winter, or the thaws that take place in spring. These dams are several feet in thickness, and of such strength, when completely formed, that a man may walk along them with perfect safety. As these dams are of the highest importance, the beavers are careful to keep them in constant repair; and if, by any accident, or the mischievous curiosity of human intruders, a part of this essential wall should give way, they immediately collect all their forces, and stop the fatal breach.

Having completed their dam, they proceed to con-

Beaver.

struct their cabins. These are partly excavations in the ground, though their roofs form a sort of vaulted dome, that rises a little above the surface. They are formed of the same materials as the dams, but, according to Mr Hearne, they by no means exhibit that neatness and architectural skill for which they have been celebrated by Buffon and other French writers. Mr Hearne assures us, that the houses have seldom more than one apartment, and never more than one floor, which is raised in the middle, to allow of the inhabitants eating and sleeping in a dry situation. The principal entrance and outlet to these houses is next the water, on the very edge of which they are constructed; and the opening always slopes towards the water, till it terminates so far below its surface, as to preserve a free communication in the most severe frosts. Some writers affirm, that this is the only opening to the house; but as the animals cannot live without free air, we must assent to those who describe another, though smaller, opening next the land. The houses are of various sizes, in proportion to the number of their inhabitants, which seldom exceeds ten or twelve, though sometimes double that number has been discovered in the same dwelling. Many of these houses stand together along the margin of the water, forming a village of from ten to thirty tenements.

During the latter end of summer, the beavers cut down their wood, and collect their roots. The former is kept in the water, whence they fetch it as occasion may require. In eating, they sit on their rump like a squirrel, with their tail doubled in between their hind legs, and holding their food between their paws. When disturbed, they utter a peculiar cry, and plunge into the water, flapping the ground and the water with their tail. This flapping of the tail, which is a very common custom with these animals, is considered by some writers as a premeditated signal to their associates.

Beavers are hunted both for their fur, which is very soft and glossy, and for that peculiar drug called *Castor*, which is not an *organ peculiar to the male*, as was once supposed, but a particular secreted matter, contained in little bags below the tail, and found in both sexes. (See CASTOR.) Winter is the season chosen by the hunters for attacking the settlements of their prey. They either block up the openings next the water with stakes, and enlarge the other opening so far as to admit their dogs; or they drain off the water by breaking down the dam, and then, securing the holes of the cabins by means of nets, lay them open at the top, and catch the beavers as they endeavour to escape.

Many thousand beaver skins are annually brought to market; and we are told, that not fewer than fifty-four thousand have been disposed of by the Hudson's-bay Company at one sale. Those skins are said to be in most esteem which have been worn for some time by the Indians, as the coarse long hair falls off by use, and there is left only the short soft down for which alone the furs are valued.

The fullest account of the manners and habits of the beaver has been given by Buffon in his *Natural History of Quadrupeds*, and Du Pratz, in his *History of Louisiana*; but for the most accurate histo
of this animal, we may refer our readers to Capta
Cartwright's *Journal of Transactions, &c. on t*
Coast of Labrador, and Mr Hearne's *Journey to t*
Northern Ocean. (*f*)

BECCARIA, GIOVAN BATISTA, a celebrat
electrician of the preceding century, was born
Mondovi, in Italy, on the 3d of October 171
We are told that he sprung from a creditable famil
and that his brother Giuseppe Maria, and an unc
by the father's side, were both military officers. Th
first studies of Beccaria were prosecuted in the roy
seminaries of his country, where, along with liter
ture, he imbibed that love of retirement which
materially aids its cultivation; and scarcely had he a
tained the age of sixteen, when he repaired to Rom
for the purpose of adopting the religious habit. H
accordingly became a monk of an order of regula
in the *Scudle Pie*, where he designed to comple
his learning: but, urged by the influence of natu
genius, he was diverted from the obscurities of sch
lastic inquiries to the more luminous paths of phi
sophy, in which he made rapid progress. He h
scarcely terminated his own studies, when he was call
upon to teach the belles lettres in the *Collegio d' Urb*
no, one of the principal rank; and the talents an
diligence which he displayed in his new office, ampl
justified the choice made by his superiors. Beccar
at this period produced some elegant compositions
Latin verse, which are disseminated in various co
lections. He admired poetry; and the works
Catullus, Virgil, and Dante, were the insepara
companions of his leisure hours. His admiratio
however, of the more enlarged and solid field of ma
thematics and physics predominating over the fictio
of poetry, he resolved thenceforward to devote him
self to them exclusively. He found an opportuni
of lecturing on these subjects, first in the Roy
College of Palermo, and afterwards in the publi
schools of St Calasanzio in Rome, where his lectur
were esteemed full of useful and curious informatio
Beccaria had likewise the good fortune to be em
ployed in some public commissions, which were sa
tisfactorily discharged by him; and, in particula
when the Augustine monks erected a great fabr
which obscured a Portuguese church, he had to ca
culate the number of hours in a year that the lig
was taken away, as compensation was to be made
money. He testified much zeal in inculcating th
principles of science into youth; and although the
in Rome capable of teaching were greater mathe
maticians, as Boscovich, Jacquier, and Le Sieur,
was perhaps better qualified for observing the ope
tions of nature, and unfolding them to his pupils.

Beccaria's fame having reached the ears of his
vereign, he was, in 1748, appointed to fill the cha
of natural philosophy in the Royal University
Turin, with which he received a considerable sala
On being requested by the grand duke of Savoy
repeat Needham's microscopical observations, he
dapted a reflector to the solar microscope, which thre
the object on a horizontal surface. Not long after-
wards, directing his attention to correct the error
produced by pendulums from contraction and expa

ieat and cold, he succeeded in making an im-
it on them. He devised a double pendulum,
g of two rods, connected together in such a
that when one rod elevated or depressed the
f oscillation, the other produced the oppo-
t, so that this centre was always found
me point. Beccaria likewise corrected an
S. Gravesande concerning the velocity of a
a at the end of descent; and pointed out an
of Newton in the theory of falling bodies:
invented an ingenious formula for finding the
nses, and explained many other interesting
in science.

henomena of electricity having attracted an
nary share of the public notice in general,
that of philosophers; did not escape Bec-
He entered ardently into its principles and
hich he endeavoured to explain by a won-
iety of experiments and observations. These
g protracted, and frequently reverted to, and
fertility of his mind in analysis and combi-
In this branch he has perhaps made deeper
advanced more rational theories, and thrown
ight on the operations of nature connected
han any other individual has done. In the
3, he published a volume called *Elettricismo
e e Naturale*, which, after receiving numer-
tions during several successive years, was,
th other tracts, translated into English in
n that work he enters on all the different ap-
of electricity in the natural state, and shews
can be imitated by art. He conceives that
rous atmospherical phenomena, not only of
nd lightning, which constitute natural elec-
its most evident and terrific shape, but that
, and water-spouts, proceed from it; and
quakes and volcanoes have also an intimate
vith it

ia was appointed master of experimental phi-
by the duke of Chablais in 1764, about
ne he published two dissertations on the
efraction of Iceland crystal, dedicated to
of York, who was then travelling through
nd he also wrote on the power of the elec-
and of lightning on the air. In 1774, he
l the result of his measurement of a degree
eridian, which he had undertaken by order
vereign, nearly ten years before, under the
Gradus Taurinensis. This he had accom-
ith uncommon fatigue and difficulty; but it
tely involved him in a serious controversy,
skill and accuracy were equally questioned.
noted astronomer, did not hesitate to as-
errors of the measurement which he suppo-
ist, to the inexperience and want of correct-
e author; and, as he was himself well prac-
milar matters, his opinion could not fail to
ght. Beccaria doubted for a long time
he should make any reply. At length he
seven letters in 1777, exculpating himself
charge of inaccuracy, and demonstrating,
defects and irregularities were to be impu-
e attraction of the neighbouring mountains.
ries of electricity were likewise attacked on other occasions; and he was much occupied in defending himself, which he was able to do successfully.

Beccaria's favourite pursuits occupied the greatest part of his attention; and he was continually making additions to what he had already established, and engaged in laying down new principles. These were contained in detached tracts, addressed to his literary contemporaries of eminence, or included in the publications of learned societies of which he was a member. The Royal Society of London had elected him one of its members; that of Bologna did the same; and he was an honorary member of the Academy of Painting and Sculpture at Turin.

Beccaria formed a correspondence with Dr Franklin, to whom he inscribed one of his works; and he even made a translation of Franklin's treatise on *The Increase of Mankind, and the Population of Countries*, from English into Italian, which yet remains in manuscript. Franklin entertained a high esteem for Beccaria, and dedicated to him a new invented instrument, consisting of a combination of musical glasses, which he called *Harmonica*.

The fatigues which Beccaria had undergone in completing the measurement of the terrestrial degree, had laid the foundation of a dangerous malady, which, in 1776, exhibited itself in alarming colours. Surgical aid afforded a temporary relief, but in each succeeding year the malady made frequent returns. In addition to its pressure, he was attacked by an intermittent fever, and at last sunk under the violence of both, towards the end of 1781.

During his life, Beccaria enjoyed distinguished reputation, not of that artificial kind which sometimes falsely raises men to notice, but founded on the merit of intrinsic learning. The variety and depth of his information proved that he possessed a capacious mind, one capable of embracing an extensive sphere, and of conquering the difficulties opposed to the acquisition of knowledge. Though addicting himself chiefly to the elucidation of the phenomena of electricity, from which his fame has chiefly been gained, the works which he has left on astronomical subjects and natural history deserve approbation. His industry was wonderful: besides no less than fifty different treatises published by himself, many manuscripts were found at his decease, written on topics, concerning which he had derived no previous eminence, but all evincing the power of his genius.

Notwithstanding the literary talents of Beccaria, it cannot be denied, that he was far from being a popular character. The rudeness and asperity of his manners excited disgust: his love of fame incurred the jealousy of others who beheld him with less partial eyes; and neither his fellow-citizens nor his own fraternity entertained affection for him. He would acknowledge no superior or equal in those sciences which he peculiarly cultivated, and, wrapt up in retirement, he knew little of the sentiments of his neighbours. Yet amidst all these defects, he preserved a singular degree of fortitude, and hardly interrupted his philosophical investigations, while labouring under the excruciating pains of that disease which terminated his existence. (*c*)

BECCLES, a market town in the county of Suffolk, situated on the river Waveney. As Beccles has neither the advantage of the mail nor of turnpike roads, no trade of any importance is carried on in this place. The town consists of several streets, which converge into a spacious area, and is adorned with an elegant Gothic church, which commands a delightful view of the windings of the river Waveney. Population 2788, of whom 453 were returned as employed in trade. Number of houses 601. (*j*)

BECKET, Thomas a, archbishop of Canterbury, was the son of Gilbert Becket, sheriff of London, and was born in that city A. D. 1119. Being destined for the church, he prosecuted his studies at Oxford with great assiduity and success; from thence he was removed to Paris, and then went to study the civil and canon law at Bologna. Endowed with great natural abilities, and possessing industry sufficient to bring them into exercise, he had attracted the regard of Theobald, archbishop of Canterbury, who, pleased with his great proficiency in knowledge, and his graceful appearance, received him into his confidence, and gave him early testimonies of his affection and friendship. He conferred upon him the prebends of London and Lincoln, and afterwards promoted him to the archdeaconry of Canterbury. Becket had been employed by his patron in some important negociations at the court of Rome, which he conducted with such dexterity and success, that Theobald recommended him in the strongest terms to the protection and favour of Henry II. That monarch, already prepossessed in his favour, from his having been instrumental in procuring from the pope those prohibitory letters against the coronation of prince Eustace, which tended so much to his advancement, listened with satisfaction to the recommendation of the archbishop; and scarcely was Henry seated on the throne, than Becket was raised to the chancellorship of England, the first civil office in the kingdom. This sudden exaltation was only a prelude to farther honours. Besides a number of ecclesiastical benefices, he had several baronies, which had been escheated to the crown; he was made provost of Beverley, dean of Hastings, and constable of the Tower; and, to complete his grandeur, he was entrusted with the education of prince Henry, the heir-apparent to the throne. The whole weight of public affairs had devolved upon Becket, and he executed them entirely to the satisfaction of Henry. His extraordinary merit had gained him the confidence of his sovereign, and, by his lively conversation and agreeable manners, he had insinuated himself into his affection and esteem. In all his actions he appeared to have his master's interest at heart; and during his relaxation from business, he was in general the companion of his amusements. Becket had laid aside almost entirely the habit and manners of an ecclesiastic. He lived in the most sumptuous and luxurious stile. His house was daily crowded with the chief nobility of the kingdom; and his magnificent entertainments, and pompous retinue, had never been equalled by any subject. The greatest barons were proud of his attention and friendship, and the king himself was frequently found at the table of the chancellor. He entered with spirit into all the exercises which were practised by the most accomplished cavaliers. Horsemanship and hunting were his frequent amusements, and he even delighted in military fame. He attended the king in his wars at Thoulouse with 700 knights at his own charge, and acquired considerable renown in the various actions in which he was engaged. In short, Becket was regarded as the gayest courtier of his time, the chief favourite of his prince, and the second person in the kingdom.

Henry had observed, with a jealous eye, the usurpations of the clergy, and from the commencement of his reign, had shewed a fixed determination to maintain his authority, and to repress every encroachment. The death of Theobald, archbishop of Canterbury appeared a favourable opportunity for setting bounds to their power, by appointing to that high dignity creature of his own, upon whose devotion he could depend, and from whom he might fear no opposition to his measures. The eyes of Henry were immediately turned upon Becket, from whom he had received many proofs of attachment; from whose gratitude he expected the most entire submission; from whose abilities he looked for assistance and support; and whose freedom from superstition pointed him out as the fittest person for governing the church in tranquillity. Becket was accordingly nominated to the vacant see and was consecrated at Canterbury, June 6th 1162. But the flattering prospects of Henry received their death-blow from the very hands by which he expected they were to be realised. The ambition of Becket had risen with his fortunes; his high spirit had escaped from the controul of civil authority; and from being the dependant of his sovereign, and the creature of his will, he now arrogated to himself the power of an equal. His accession to the primacy was immediately followed by a complete change in his demeanour and conduct. The luxurious dainties of his table were excluded for the meagre diet of a recluse bread and water with unsavoury herbs; his splendid apparel was replaced by sackcloth and vermin; and the gay exercises and sports of a cavalier, were exchanged for the conversation of monks, and the flagellations of pennance. In imitation of our Saviour he daily, on his knees, washed the feet of thirteen beggars, whom he afterwards dismissed with presents; and the vulgar were excited to reverence and admiration by the numerous charities, and the abstemious severity of the holy primate. His first step was to break off all connection with Henry, by returning into his hands the commission of chancellor and he entered upon the functions of his sacred office with the fixed purpose of defending its prerogatives and of resisting every measure which appeared derogatory to his dignity, or subversive of his power. Not content, however, with acting upon the defensive he was the first who provoked hostilities, by his arbitrary conduct, and illegal persecutions. The most scandalous irregularities prevailed among the lower order of ecclesiastics. Crimes of the deepest dye were daily committed with impunity; and even in cases of rape and murder, the offenders were screened by the archbishop from the punishment of the civil law. He would suffer no interference with the privileges of the church; and when commanded by Henry to revoke a bull of excommunication, he insolently re-

or answer, that it belonged not to the king n him whom he should absolve, and whom he xcommunicate. Henry, perceiving the error ich he had fallen, in preferring Becket to a . which presented such a wide field for his ı, was nevertheless resolved to persist in his , and to counteract, by every means, the in- influence and power of the clergy. In the *tions of Clarendon*, which were drawn up for pose, the powers of the church are clearly de- d by them ecclesiastics of every denomination ced to a due submission to the laws of their

At a general council held at Clarendon, 25th 1164, all the bishops, with Becket himself, seals to these constitutions, and promised oath, *legally, with good faith, and without reserve*, to observe them. But the refusal Alexander to ratify these laws, so hostile to tical supremacy, furnished Becket with an or withdrawing his assent; and he obtained om his Holiness to relieve him from the obli- of his oath. An open rupture now ensued Henry and the primate, which was prose- . both sides with equal rancour and obstina- it as this dispute, with its consequences, in- ı it a considerable portion of English history, refer for a particular developement of it to cle, and confine ourselves at present to the ominent incidents in the life and character of

By a most violent and arbitrary prosecution art of Henry, Becket was compelled to leave gdom. He was received on the continent as a ed disciple of the cross, and was treated with spect and kindness by Louis VII. of France, pe Alexander III., the latter of whom ap- him a residence in the abbey of Potigny in dy. From thence he fulminated excommuni- against the ministers and chief confidents of and all who should adhere to the constitutions ndon. He even threatened to excommunicate himself, and was prevented only by the in- on of Louis. After six years of irritation nosity, an accommodation was brought about ıs of Alexander and the king of France, when was restored to his dignity and privileges. return to England, he was received with est veneration by the populace, who cele- his entrance into Southwark with hymns of acclamations. But this accommodation was tely succeeded by fresh aggressions on the Becket. Scarcely was he reinstated in power, began to launch his spiritual thunders, and entence of excommunication against all the who had assisted in the coronation of the ing. When Henry was informed of this pro- , he could not restrain his indignation; and in arded moment, he was heard to express a wish ne one would deliver him from his troublesome y. Four barons, touched with the feelings master, departed with a determination either el the archbishop to submission, or to put him ı. They hastened to Canterbury, and found at vespers in the church of St Benedict. They ded him in the name of Henry, to absolve the unicated prelates, which they accompanied with reproaches and threats. But he courageously refusing to listen to their remonstrances, and haughtily defying their vengeance, they cleft his skull as he kneeled at the altar, and scooping out his brains with the points of their swords, they scattered them over the pavement of the church. Thus fell Thomas a Becket, the most undaunted champion of papal supremacy, on the 29th December 1170, in the 52d year of his age.

What were the principles upon which Becket acted, whether from a love of power, or from a conscientious regard to the duties of his office, it is difficult to determine. That hypocrisy entered into his character, the sudden change in his conduct leaves us little room to doubt; but to what period of his life it ought to be attached, whether before or after his accession to the primacy, may be disputed. In that age of superstition, every ecclesiastic was brought up with the highest ideas of the supremacy of the church; and we cannot suppose that Becket, who had been a disciple of archbishop Theobald, and who had spent a part of his life at the court of Rome, would be wanting in zeal for its interests. From the high favour in which he stood both with Theobald and his sovereign, he could not but look with confidence to the see of Canterbury; and his appearing to take little interest in ecclesiastical affairs, and to acquiesce in all those measures which Henry meditated for abridging the powers of the clergy, was, in all probability, the mask which he assumed for securing the object of his ambition; for if we may believe his biographers, though he entered into all the gallantries of a luxurious court, he remained constantly temperate and invincibly chaste. Immediately upon his exaltation, however, the mask was thrown aside, and it was then that he appeared in his real character, as the champion of the church and the defender of its rights. How far he acted in conformity with the dictates of popery; whether his errors were of judgment or of will; and what degree of moral turpitude ought to be affixed to his conduct, we leave our readers to determine. His predecessor had set him the example of opposition to his sovereign, and there were many in that age, who, had they possessed the abilities, the courage, or the persevering inflexibility of a Becket, would have acted the same part. We mean not, however, by what we have said, either to justify his measures, or the manner in which they were pursued (though the unwarrantable prosecutions of Henry might palliate in some degree his inveterate obstinacy.) But " in passing judgment upon the characters of men," says our elegant historian Robertson, " we ought to try them by the principles and maxims of their own age, not by those of another." When we reprobate Becket, then, our censure must extend to the church of which he was a member, and to the prejudices of his times, which ranked him with the most illustrious martyrs, and cherished his memory with the most superstitious veneration. Becket possessed abilities which entitled him to the high station which he attained, and which claim our admiration and respect: but his ingratitude to his master, his ambition, and his overbearing arrogance, expose him to our severest reprehension; and we cannot but lament the prostitution of those talents in the cause of a bigotted superstition, which, had they been directed to the support of law and justice, would have proved a blessing, instead of a fire-brand to his country. See Hume's *Hist. of England*, vol. i. p. 410—448, 8vo.; Lyttelton's *Hist. of Henry* II. vol. ii. p. 231, &c. 8vo.; Henry's *Hist. of Great Britain*, vol. v. p. 340, &c. 8vo. (*p*)

BED, a place raised above the level of the floor of an apartment, on which the body is stretched out for rest and sleep.

In ancient times the beds consisted of a heap of herbs and leaves, with the skins of beasts for a covering; and even in the time of Pliny, the soldiers when encamped made use of that rude couch. In process of time, however, the Romans constructed their beds in a more luxurious manner. The fine wool of Miletus, ebony, cedar, and citron wood, were all employed in the construction of this piece of furniture. Sometimes they were even made of ivory and massive silver, having their coverings of purple enriched with gold.

Beds, at first employed for the purpose of recruiting the body by rest and sleep, were afterwards used for other purposes. The luxurious Asiatics stretched themselves upon beds when they devoured their meals, and the Greeks afterwards imitated this indolent practice. The ancients made use of beds when they were engaged in their prayers, and in this singular custom they were imitated by the first Christians. The ancient poets too, often recited their compositions from their beds, and even their philosophers placed themselves in that attitude of repose, when they gave lessons to their disciples. See Homer's *Iliad*, lib. xxiv. v. 644. *Pliny*, lib. viii. cap. 48; lib. xvi. cap. 36; lib. xxiii. cap. 11. *Stat.* 11 Hen. VII. cap. 19. Suetonius, *In Vit. Aug.* cum. Not. Casaubon. Scheffer *de Torquibus*.

An account of beds of particular constructions will be found in the *Machines Approuvées*, tom. iii. p. 67. *Phil. Trans.* 1732, p. 256. *Mem. Acad. Par.* 1742. Hist. p. 155. *Id.* 1745. Hist. p. 81. *Id.* 1746. Hist. 120. *Id.* 1771. Hist. 68. *Id.* 1772. Hist. *Machines Approuvées*, tom. vii. p. 121. *Id.* tom. vii. p. 321. *Repertory of Arts*, ii. 104. (*j*)

BEDA, or BEDE, usually called the Venerable Bede, was born at Weremouth, in Northumberland, in the year 672; and, at the age of seven years, was sent to the monastery of St Peter, whose abbot and founder, Benedict Biscop, was one of the most learned men and greatest travellers of that age. Here he enjoyed the use of an excellent library, and the assistance of the ablest instructors. Abbot Benedict himself, Ceolfrid his successor, and St John of Beverley, were all his preceptors; by the last of whom he was ordained deacon, at 19 years of age, and priest at 30. He seems, however, to have removed to another monastery, founded also by Benedict, at Tarrow, near the mouth of the river Tyne, where he spent the remainder of his life in devout exercises and literary pursuits. By his astonishing application and comprehensive talents, he made himself master of every branch of literature, which it was possible to acquire in the period in which he lived, and in the circumstances in which he was placed. He was held
high estimation by the most eminent prelates of t
age, and particularly by Egbert, bishop of York
man of the most extensive learning. His fame
so great, that it rapidly spread through every co
try in Europe; and he was even invited by P
Sergius to Rome, that he might be consulted by t
pontiff upon many subjects of importance. Be
however, still continued his monastic course of li
diligently employing himself in the acquisition a
communication of useful knowledge. He compo
an astonishing number of treatises, many of whi
have never been published; and wrote upon so gre
a variety of subjects, that his works, it has been
firmed, contain all the knowledge which was then
be found in the world, and every point of antiquit
at least, which is now worthy to be read. Th
greatest of his writings, was the ecclesiastical histo
of England, which he completed in the 59th year
his age, and which is still a performance of the hig
est authority. His writings were so much esteeme
that even during his own life, a council held in Eng
land, and afterwards approved by the catholic churc
appointed his homilies to be publicly read in th
churches. He was the first who translated so
parts of the Bible, especially the gospel of John, int
the language of this country, which was then Saxo
and it was the anxious occupation of his last momen
to finish that portion of the sacred book. All h
other works were composed in the Latin languag
in a style remarkable for its perspicuity and ease, b
frequently deficient in purity and elegance. H
could not be exempt from the influence of that cr
dulity, which was the character of the age in whic
he lived; but if allowances be made for the peculi
rities of his times, and the disadvantages with whic
he had to struggle, he must be acknowledged t
have been the most laborious and ingenious perso
that this country ever produced. He is justly cele
brated for his exemplary piety, astonishing learning
incredible application, and extreme humility. H
is called by Camden, "the singular light of ou
island, whom we may more easily admire than suff
ciently praise." He was named by his contempo
raries *the Wise Saxon*; and has been entitled by pos
terity, *the Venerable Bede*: and indeed, "as long,"
says an eminent historian, "as great modesty, piety
and learning, united in one character, are the object
of veneration, the memory of Bede must be revered."
He laboured, during the concluding period of hi
life, under a very infirm state of health, which ha
been induced by his unremitting application, an
which he bore with devout resignation. Having ex
hausted his last remains of strength in dictating
translation from sacred scripture, he breathed a piou
exclamation, and expired in his cell at Tarrow, in th
year 735. His body was interred in his own mona
tery, where he died, but was afterwards removed
Durham, and placed in the same coffin with that
St Cuthbert. The first edition of his works wa
published at Paris, in 1544, in three volumes folio
and the latest at Cambridge in 1722, with notes an
dissertations by Dr Smith, prebendary of Durham
An account of his printed pieces may be found in

es to his life, in the *Biographia Britannica*, or
Appendix to the 4th volume of Dr Henry's
of Britain; but a complete list of all his
s, drawn up by his own hand, is inserted in
ri *Antiq. Italic. Medii Ævi*, tom. iii. p. 825.
og. Britan. General Biog. Dict. Henry's
f Britain, vol. iv. Cave's *Hist. Liter.* vol. i.
's *Hist. of Poetry*, vol. i. p. 104.; and Mo-
Church Hist. vol. ii. p. 247, 251. (*q*)

FORD, a very ancient town in the central
England, and the capital and only borough
the county of the same name, (See BED-
IRE,) is situated on both sides, but principally
north side of the Ouse river, which is naviga-
n the Eastern Sea, or German Ocean, by way
n, Downham, Ely, St Ives, Huntingdon, and
ts, to this town. Bedford is situated rather
f the centre of the county, and at the northern
a very wide vale, of strong but good clay
alled the vale of Bedford: in the immediate
he town, several strata of grey compact lime-
bounding with gryphites and other species of
ells, usually denominated anomia, having very
ue or black beds of clay between them, ap-
m under the thick strata of clay which com-
e vale of Bedford, and the hills north of it.
nestone, which is dug and burnt on the west
the town, and of which the churches, the
and most of the ancient buildings are con-
l, has hence been denominated the "Bedford
e," in the enumerations of the British strata
William Smith and his pupils. See the *Phi-*
al Magazine, vol. xxxvi. p. 105.

town was called by the Saxons, Bedan Ford,
g the fortress on the ford, alluding to an im-
umulus, or mound of earth, which, perhaps
this, was raised by immense labour from a
rrounding it, on the north bank of the river,
to the ancient ford, and site perhaps of a
in more modern times, about 200 yards east
resent bridge, which is itself a work of con-
e antiquity. Offa, king of the Mercians, is
ave been buried in a small chapel, seated on
to the Ouse, in this town, of which no ves-
w remains. A desperate battle was fought
town, in 572, between Cuthwolf the Saxon
d the Britons, which terminated disastrously
natives; and the inhabitants of Bedford in
ence were a prey to their merciless invaders:
quently renewed their marauding visits, until
911, when they were defeated and driven
s part of the country. The third baron of
, Baron de Beauchamp, built a very strong
ious castle, on and around the site of the an-
rt, surrounding the whole by a very deep
estiges of which still remain on the east and
the north sides: the site of the castle being
upied by the gardens and paddock belong-
he New Swan Inn; and the spacious top of
and tumulus above mentioned, by a pleasant
green, which is surrounded by tall elm trees,
w on the steep sides of what still bears the
the Castle-hill.

te Duke of Bedford, justly stiled the "Great Duke of Bedford," purchased the site of this castle, and a miserable inn which stood at the corner of the bridge, from one of the inhabitants, and, at the expense of £9000, erected here a magnificent inn, for the general accommodation of the inhabitants and travellers, but more especially for the meetings of the justices, grand jury, &c. at the times of the assises and quarter sessions, and the inhabitants at county meetings, and on other public occasions. The south and west fronts of this building are faced with the beautiful white free-stone from the lower beds of the chalk strata, brought from Totternhoe, near Dunstable: all the other parts are of limestone, raised from the fosse of the Castle-hill just bye.

The great strength of the castle of Bedford rendered it a place of contention in most of the civil wars which rent the kingdom, in the ages which succeeded its erection. King Stephen besieged this castle, and reduced it. The refractory barons, in the reign of King John, possessed themselves of Bedford castle, until expelled by Fulco de Brent, a general in the king's army, who, in reward for his services, received a grant of this castle, which he held until, in the succeeding reign, he in his turn rebelled, and was taken and sent prisoner to London, after a vigorous siege of 60 days, by Henry the Third, who, after hanging 25 of the rebellious knights found in this castle, demolished it; since which period, the mason and the lime-burner have long removed and used every stone which formed the massive walls of this once formidable castle.

Bedford contains five different parishes, viz. St Paul, St Peter, and St Cuthbert, on the north side of the river, and St Mary and St John on its south side. St Paul's church, which was collegiate before the conquest, is the largest church, and is ornamented with a tall octagonal spire, the latitude of which, according to the government trigonometrical survey, is 52° 8′ 8″.8 N. and its longitude 0° 27′ 43″.3 W. of Greenwich observatory, or 1′ 50″.9 in time. The government of the town is vested in a mayor, recorder, deputy-recorder, an indefinite number of aldermen, (who have served the office of mayor,) two bailiffs, and thirteen common councilmen. Until about the year 1798, the corporation of Bedford had for a long time numbered in its body but few of the largest merchants, traders, or opulent persons of the place, and continual jealousies and civil broils were the consequence of these distinctions, which the genius and conciliatory talents of the late Duke of Bedford, their recorder, enabled them to remove, and many beneficial measures for the improvement of the town were and since have been the consequences. The bailiffs are lords of the manors, and have right of fishing in the Ouse river for nine miles each way from Bedford.

Henry III. granted the borough to the burgesses for £40 yearly; but they having omitted to pay the crown rent, it was seized by Edward I. In the reign of James II., the town having neglected to return two burgesses to serve in parliament, the mayor and aldermen were expelled their offices by the king, and his ministers nominated two members of parliament for the town. Their charter was, however, restored by

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this king, and the right of election remains vested in the burgesses, freemen, and inhabitant householders not receiving alms, amounting to about 1400 voters.

Bedford was made a dukedom by Henry V., and the honour conferred on John Plantagenet, third son of Henry IV., who was the first duke of Bedford: a title, which was successively enjoyed by the Nevils and De Hatfields, and at length was bestowed on John Russel, the ancestor of the present Duke of Bedford.

This town is distinguished as much by the variety of its religious sects, (which, besides all the common classes of religious persuasions in England, has Jews and Moravians among them,) as by the number and extent of its charitable endowments. The hospital of St John is said to have been founded in 980 by Robert de Paris, who was the first master: it now has 10 poor men under the rector of St John's church, who is the master. St Leonard's hospital was built and endowed in the reign of Edward I., and the hospital of Grey Friars in that of Edward II. by Mabilia de Paterhall. Thomas Christy founded an hospital for 8 poor people, endowed a charity-school for 40 children, and repaired the old town-hall, a wooden building, which has since been removed, to widen and open the street, and a new one erected. The benevolent and well-intentioned Sir William Harper, a native of Bedford, having settled in London, and become Lord Mayor in 1561, he purchased, for £180, 13¼ acres of land in St Andrew's parish, Holborn, which, with his dwelling-house in Bedford, he bequeathed to the corporation of Bedford, for the endowment of a grammar school, and *for apportioning young women of the town upon marriage;* a fruitful source of evil to the poor girls themselves, in the temptation to which it has exposed hundreds of them, from soldiers of marching regiments and the most abandoned individuals, who have married them in hopes of "fingering Harper's twenty pounds!" and of ruin to the town in its consequences. The original rent of this Harper charity-estate in London was £40. In 1668 it was leased for 41 years, at £99 per annum; and the rapid extension of London having commenced, a reversionary building lease was granted by the trustees for a further term of 51 years, at £150 per annum: the whole having been covered by valuable houses, forming Bedford Row and the adjoining streets; and the leases having fallen in, and new ones been granted, the present net rent is £4000, and shortly is expected, by second renewals, to reach £5000 per annum! Yet, notwithstanding all these, and numerous other sources of relief, unknown to the indigent of the greater part of the kingdom, such is the effect of charity distributed *by law*, and without sound *discretion* in the distributor, that Bedford, having never possessed extensive manufactures which had declined, after drawing together a surplus population, became so oppressed by poors rates, that in 1794 the inhabitants, by way of checking the growing evil, which threatened to swallow up all their property, applied to parliament for an act for consolidating the 5 parishes, as far as concerns the maintainance of the poor, and building and organising an effective "house of industry," the money for which purpose was raised principally on life annuities measure which, with the growing expenses of poor, increased the poors rates to *seventeen shilli and sixpence in the pound* on the rack rents, duri some years. The just terrors to the dissolute poor, being *made to work*, if able, and a fortunate exti tion of money annuities, had, however, in 1803, duced the poors rates in Bedford to 6s. 4d. in t pound rent, (while yet, the average of the wh county, without this town, was but 3s. 9d. in t pound rent,) and a further reduction of rates h since followed; but ever must the poors rates of t town continue to mock the evils of gratuitous ma riage portions, distributed with little of that sou discretion which must ever direct the distribution *charity*, unless an evil is to be produced instead the good intended.

The late Mr Whitbread left handsome legacies f building and endowing almshouses, and towards t erection of a county infirmary, which has since be carried into effect. A new county gaol and brid well, and a new town gaol, have lately been built. I the loathsome gaol in this town, which has not ma years been pulled down, the well-known John Buny wrote most of his books, in the 17th century, duri a captivity of near 20 years, for the crime of *preac ing;* a prosecution, instigated by a spirit of intole ance, happily unknown among the present inhabita of Bedford. The county hall, where the sessions a held, is a handsome and commodious stone buildin This town, particularly the southern part of it, subject to inundations from the swelling of the Ou after sudden rains: of late years these have be more frequent and greater than formerly, as is supp sed from the general straightning and opening brooks, in the many newly inclosed parishes whi drain into the Ouse, which now pour their floods wi more celerity than formerly, into the vale of the Ou whose swell, comparative declivity, and numero mill-dams and sinuosities, occasions the tempora stagnation of the water, 12 or 15 feet deep on t meadows in many places, on such occasions.

Bedford is 50 miles from London, having the Lee mail-coach running through it daily: it arrives fro London at 7½ hours in the morning, and leaves Be ford for London at 2¼ hours in the afternoon. bank has some years been established here, by t firm of Barnard & Co., who draws on Harrisons Co. in London.

Thread-lace making, by the poor women and gir is the principal manufacture of the place. So coarse baises are made at the house of industry; little wool-combing is done; coke is burnt, in high domed ovens, for the use of malsters: some lime burnt, and tiles made for sale to the neighbouri villages: besides which, we have not heard of any ma nufactures in this place. Bedford is, on the whol pretty well built, and rather a handsome and cle town, with excellent gravelled roads out of it in directions.

The town of Bedford, according to the parliame tary returns of 1801, contained 800 houses, and 394 inhabitants: of whom 1712 were males, and 2236 fe males; a disproportion between the sexes, which

illustrates our remarks above, on premiums
ages. There are here 2221 persons employ-
le, manufactures, and handicraft. (ę)

ORDSHIRE, is an inland county of Eng-
nded on the S. W. and W. by Buckingham-
the N. W. and N. by Northamptonshire, on
d N. E. by Huntingdonshire, on the E. by
geshire, and on the S. E. and S. by Hert-
. It is situated between the parallels of 51°
2° 17′ of north latitude, and between 0° 17′
′ of west longitude from Greenwich. A great
s bounds are artificial, and strangely indent-
ey are affected by the manors and proper-
s edge, and not by rivers or summits of
, which are natural divisions. The whole of
ty is situated on the eastern side of the wa-
or grand ridge of the island, and the whole
face drains to the Ouse river, with the excep-
tract of chalk on the south, about Luton,
Houghton-Regis, and Dunstable, which
the sea, and a smaller tract near Market-
udham, and Whipsnade, which drains to the
oth of these being branches of the Thames
small tract of clay in Dunton, Eyworth, and
gworth, which drains to the Cam; and a
clay and limestone land near Puddington,
h, and Wimmington, at the north end of the
which drains to the Nen.

ighest range of hills in or near to Bedford-
the Chiltern hills, of the upper chalk, which
art, and skirt the remainder of the southern
y of this county, from Whipsnade near Dun-
near Baldock: and no other land in Bed-
approaches near to their height, as appears
range of freestone hills across Northampton-
m Catesby to Naseberg; and of limestone and
n Salsey Forest near Olney, to near Higham-
being visible by telescopes from the chalk
oss the whole of Bedfordshire. The next
nsiderable range in height, is of clay, cros-
county near its northern end, which it enters
st of Harold, and proceeds by Souldrope,
Park, between Keysoe and Colmworth, and
e county near Staughton-Parva. The next
nsiderable range, is of sand, and enters the
near Aspley Guise, passes to Ridgemont,
Lidlington, Milbrook, and Ampthill; and
hence to Hawnes, and near to Old-Warden.
range of alluvial clay principally proceeds
lower chalk hills between Houghton-Regis
lon, and proceeds by Tuddington, Milton-
Woburn-Park, and Ridgemont, (crossing
sand ridge before described,) by Brog-
Park, Cranfield, across a neck of Bucking-
, and then near to Turvey, Carlton, and Pa-
. From the lower chalk hills, also near Sun-
ther clay ridge branches, and passes through
on, and near to Silsoe and Upper Graven-
nd another alluvial clay range, which leaves
hills east of Baldock, passes near Edworth,
Potton, and Cockayne-Hatley, into Cam-
ire, spreading there into the wide alluvial
clay about Caxton, and north-east of it, be-
e Cam and the Ouse.

trata of Bedfordshire were examined in the year 1801, under the patronage of the "great Duke of Bedford," in the last year of his useful life, by Mr William Smith of Bath, who was at that time (and still is we believe) proposing to publish, by subscription, a map of England, shewing the range of all the principal strata across the island, and a volume explaining the same: during which examination of Bedfordshire, he was accompanied by his Grace's agent, Mr John Farey, and by his friend Mr Benjamin Bevan, who, as pupils of Mr Smith, the former in particular, have since industriously pursued the subject of stratification, and others connected with it, (See *Philosoph. Mag.* vol. xxxiii. p. 258, and vol. xxxv. p. 114.) and the making of mineral surveys, on principles which cannot fail of success, in making us acquainted with the subterranean geography of countries. From what we have learnt from Mr Farey, and other sources, we are enabled to present the following sketch of the Bedfordshire strata, as far as they are visible or accessible, owing to the vast mass of alluvial matter, (principally the broken and slightly worn ruins of the chalk and its covering strata,) of districts to the south-east of the county. See *Phil. Mag.* vol. xxxv. p. 135.

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The alluvia of Bedfordshire cover at least four-fifths of its whole surface, and principally consist of yellow and dark-coloured clays (apparently the ruins of the great clay above the chalks on which London is situated,) intermixed with flint nodules, and chert nodules, in all the various degrees of breaking and rounding, also of rounded grit-stones, and of small bolders of the harder beds of chalk, and crystallised quartz pebbles, in a highly rounded state; large ludus helmauti, (such as the Roman or Parker's cement is made from in Essex, Kent, &c.) and other ferruginous nodules; rounded fragments of hard grey and blue limestones of various kinds, and with numerous shells of different sizes and species imbedded in them; rhombic crystals of selenite, eckini and their spines in flint and hard chalk, and the numerous other fossils of the chalk strata. Several of the ranges of alluvial clay hills in the above account, seem to owe the greater part of their elevation to these heterogeneous clayey mixtures, which in some instances exceed 50, 100, or even 200 feet in thickness, before the regular or undisturbed strata on which they rest can be reached. A very large portion of the space, which is coloured blue, in Thomas Batchelor's map of soils, affixed to his agricultural survey of this county, is occupied by these alluvial clays, in which, as the pebbles of quartz, chert, flint, chalk, limestone, grit-stone, &c. and sand, more or less abound, clays and loams of almost all degrees of tenacity and fertility are produced; they are, however, generally too wet, and are difficult and very expensive to drain, owing to the uncertain and irregular mixture of the sand and gravelly patches, in and upon the tenacious clay, of which the mass principally consists. Besides these clayey and alluvial mixtures, there are in Bedfordshire great quantities of broken flints and cherts (chippings or rubble, rather than rounded gravel) intermixed with highly rounded quartz and hard chalk, and with sand, which form clear, sharp, or sandy gravels, gravelly and sandy loams, &c. most of which are very productive to the husbandman. The

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bottom of the vale of the Ouse, and the low hills situated in it, all the way from St Neots to Sharnbrook, and also of the vale of the Ivell from Blunham to Shefford and Arlsey, are thus covered, perhaps two miles wide on the average, with sandy gravel, which also, in lesser quantities, lines the bottoms of the vales in most or all of the sandy district, extending across the county from Leighton-Busard to Potton, and in many other parts, as well as in issolated patches, often on the tops of the clay-hills above described, and sometimes on their sides or slopes.

A more modern alluvium covers all the flat and lowest parts of the large vales, within the reach of the rivers and brooks when swollen by floods, and which is still accumulating by slow degrees from the sediment of the flood waters which overflow these flats, or tracts of meadow soil, as the hazle loam peculiar to these situations is often called. Upon the gravel, in the bottoms of the vales in the sand district, peat has grown, and, in most instances, where draining has not been effected, is still increasing, aided by the ferruginous or ochreous sediment of the floods which cover them occasionally: but whence the sulphuric acid is derived, which abounds in such quantities in the sandy peat valleys of Bedfordshire, is, as Mr Batchelor observes, page 54 of his Report before quoted, not easy to guess. As the peat of these valleys, (which has little interruption on the Ivell from Evenholt down to Sandy,) by decomposition, becomes solid and almost impervious to water, at its lower parts in particular, the springs, or soakage of the water, are collected, and make their way down the open floor of gravel, beneath the peat; and hence it happens, owing to the fall of the valley, and the superabundance of the supply from particular strata on which this gravel floor rests, that the gravel becomes charged with a column of water, which the decomposed and solid peat prevents from rising direct into the brook and escaping, and the same, therefore, makes its way up the gravel floor to the edge of the peat, where it is principally discharged to the surface of the peat; a circumstance which has contributed to its faster accumulation at the edges, and in many instances caused it to be higher by several feet along one or each side of the valley, than along the centre or brook-course. Appearances like these, of peat but moderately wet along the middle and lower line of a boggy vale, yet with water oozing through every pore of its sides, and even flowing over its higher edge, naturally enough suggested to the late Mr Elkington, when employed at Crawley bog, on the Woburn brook, and at Prisley bog, on the Ivell, that the source of water which occasioned the bog, was from the adjoining hills; and accordingly, he set out great lengths of drains along the skirts of Crawley bog, which were executed by his own foreman, who had worked for some years in draining under Mr Elkington in different counties. In undertaking soon after to drain the bog at Prisley, under the inspection of a committee of the Board of Agriculture, whose certificate of success was to be Mr Elkington's title to a remuneration from parliament, for his supposed discoveries of the sources of springs, and their infallible cure by draining, Mr Elkington unfortunately made here again
the mistake which has been hinted at ab
presence of the committee, staked out
south-east of Prisley farm-house for the
which was to do the business, and pr
exact width at top and at bottom, and
various parts; which particulars being c
writing on the spot, the Duke of Bedfo
expense the whole experiment was made,
sence of Mr Elkington and the commit
then written directions to his agent Mr
was present, and directed him to hire
tend the cutting of the drain which
staked out, in all respects conformable to
ton's written directions; and this was
done, with the most scrupulous exact
course of some weeks which followed.
gress of cutting this drain, Mr Farey
that the deep open cut which was makin
the most part in alluvial clay, or in gravel
no water, collected little of course, al
water was oozing out of every pore of th
in a few feet of its lower edge. These ci
induced him to examine this and other
valley bogs with attention, and led to t
of their true nature, as above; and it m
rial in confirmation thereof to observe, t
total failure of Mr Elkington's first drai
above mentioned, and of the numerous ex
branches cut from it by Mr Elkington
and under his own uncontrouled dire
these principles being explained to his G
Farey, he obtained directions to apply t
drainage of Crawley bog, which he soo
pletely effected, merely by one open dr
lowest parts of the valley and bog, and th
the peat, which however was cut through,
vel reached, in most parts of the drain.
this was, that the gravel floor of the pe
same facility conveyed such springs as
out of the strata at the edges of the pe
the central drain, as it had before given
the pent column of water in the open gra
flow up, and over the edges of the peat,
explained above. In the Grange Meadow
Park bogs, above Crawley, the same pri
followed with similar success; and short
Farey effected a still larger drainage
simple means, under the commissioners f
sure of Mulden, and at the general exp
proprietors; the works recommended by
being such only as the commissioners ju
sary to be performed, at the public drains
of the parish under the usual clauses fo
provement at the time of an inclosure, (
port on Bedfordshire above quoted, page
hope to be excused for entering into the
tails, on account of the importance of
this case of *valley bogs*, which has not, to
ledge, been done, in any of the nume
which, from the date of Dr Anderson's
the present time, have been written on th
and practice of draining.

The tops of the upper chalk hills, ab
nade and Luton, have in general a coverin
red clay mixed with broken flints, someti

Bedfordshire.

regular layers in the clay, as to have been called strata of flint, and often in such quantities, as after rain to cause the ploughed fields to appear like gravel heaps. On others of the hills of this district, particularly near Kingsworth, great quantities of the small black chert pebbles of the London clay are found, (See *Phil. Mag.* vol. xxxv. p. 131.) with broken flints and larger chert pebbles in the vallies.

The strata of Bedfordshire have an easy and pretty regular dip towards the south-east, at the rates of 1 in 50 to 1 in 80 perhaps. The uppermost stratum which appears in Bedfordshire, is a thick bed of chalk, with numerous layers of flints throughout its whole thickness; but near the top they are closer together, and the nodules larger, and the intervening chalk in this situation is more free or soft, and is alone fit for the chalking of lands and the making of whitening, on account of its friability; it is also the purest carbonate, and contains less silex and other heterogeneous mixtures, than the lower chalks do. This upper chalk advances no farther northward or north-west than the hills on each side of Luton, and those south-east, south-west, and west, of Dunstable.

The hard or lower chalk next succeeds, in which no flints are found; but the chalk increases in hardness, and the quantity of the fine grains of silex which it contains, as we proceed downwards, until near its bottom a stratum little different in appearance from those above it is found, which proves to be a very durable freestone, when seasoned or dried gradually without suffering frost to reach it, which, when fresh dug, would otherwise shiver it completely to pieces. At Totternhoe, north-west of Dunstable, there are immense and ancient workings after this stone, which will stand fire, as well as weather, in a vertical wall. Woburn-Abbey, the New Swan Inn at Bedford, and many other good buildings, are faced with this stone; and the window-jambs and ornaments of most of the churches in the midland counties are made of it. The hard beds of chalk above this Totternhoe stone, such as are seen in the second new road now cutting at Chalk, or Puddle-hill, near Dunstable, are called *hurlock*, and make a very good lime for building, probably on account of the great quantity of silex it contains; and it is from these hurlock beds, all the way from near Eaton-Bray to Baldock, that the parts north of this for several miles are furnished with lime, except a little for plasterers work or white-washing, which is brought from the softer and whiter beds of the upper chalk, to the south of the range made by the hard chalk and hurlock. The large quantity of silex, which some of this hurlock contains, may be one reason, joined with the dearness of fuel to burn it, that lime has been so little used or even tried of late years, on the clays or sands north of the chalk hills in Bedfordshire, under the idea of its not repaying the expense. The upper and lower chalk are, it is said, together about 400 feet thick.

The chalk marle is the stratum which succeeds the chalk, and on the surface when wet, makes very tenacious white or gray clayey soil; but when dry, the white colour is seldom preserved, yet a dark-coloured loam results from its decomposition, although when fresh dug into, the strata might almost be mistaken for rubbley or broken hurlock. The basset, or north-western edge of this stratum, was lately exposed by the widening the London road through Kates-hill, at the south end of Hockliff town.

In proceeding from this northward, along the road towards Towceter, nothing but thick masses of alluvial clay are seen, until near Sand-house at 40½ miles from London; and in the other road through Woburn, the same alluvial covering prevents any observations being made on the strata, until within a quarter of a mile of Woburn town the same sand makes its appearance, from under the alluvium: and it is not a little remarkable, that the distribution of this alluvial clay is so complete across the country, all the way from Billington to Cockayne-Hatley, as shewn by the blue colour in Mr Batchelor's map above referred to, as entirely to conceal from the knowledge and use of the inhabitants of Bedfordshire, the remarkable limestone strata of Aylesbury, and several others, which no where burst through or shew themselves from under the alluvia, the "golt" of the Rev. Mr Michell. See the *Phil. Mag.* vol. xxxvi. page 103.

The Woburn sand is a name for a series of ferruginous sand strata, about 170 or 180 feet thick, whose basset crosses Bedfordshire from Leighton-Busard to Potton, as already mentioned, when speaking of the alluvium and peat upon it. In most parts this sand near the surface is cemented by an oxide of iron, into a dark red sand-stone, the grains of silex in which are of very unequal sizes, even in the same specimen. This stone is called car-stone in some places, and was for many years, previous to the roads in Woburn being undertaken by the late Duke's agent, the sole material used on the roads; and the grinding of it, and subsequent washing away of the ferruginous cementing matter by the rains, occasioned two-thirds in length of those deep, loose sandy roads, (which were the remark and terror of travellers who valued their horses, under the name of the Woburn Sands,) across tracts of alluvial clay, where not the least sand is to be found but what has been brought thither, when in the form of car or sand-stone. It is much to be lamented, that this absurd practice still continues in the parishes of Wavendon and Broughton, between Woburn and Newport Pagnel, instead of searching for and clean sifting the quartz and flint gravel, which is to be had in sufficient plenty.

The most remarkable feature of the Woburn-sand strata, are the beds of fullers-earth which they produce near the bottom. It is believed, that in whatever part of the basset of this sand across England a search is made, the fullers-earth will be found, but generally in thin and foul beds, of no value, and also the silicious or cherty-stone of a peculiar nature and fracture which lies beneath it, and the specimens of petrified wood which also abound in the same situation; but over several hundred acres at the least, on the north-west of Woburn, both in Aspley-Guise parish in Bedfordshire, and in Wavendon in Buckinghamshire, this substance is found from five to seven or eight feet thick, between the beds of sand or sand-stone, perfectly free from any extraneous matter. The original and most extensive workings, which seem of great antiquity, were on Aspley Common Heath, and in Aspley-Wood in the same parish; and hence it was truly said, that these celebrated pits were in

Bedfordshire.

Bedfordshire, but at present the only pit (or rather mine, as it is now worked) which is in use, is near Hogstyend, in a point of land in Wavendon, which bends round in rather an extraordinary way into the parish of Aspley. The demand for this article, once so highly prized by the clothiers of this and other countries, has dwindled almost to nothing within twenty or thirty years past. The very great accumulation of alluvial clays on the Caxton range in Cambridgeshire, and these again between Leighton-Busard and Winslow in Buckinghamshire, almost entirely bury and conceal these sand strata for many miles on each side of Bedfordshire.

The clunch clay, so called by Mr Smith from several thin beds near to its top and to the Woburn or fullers-earth sand, which this clay underlays, of a soft perishable stone, much resembling hurlock, or hard chalk, when fresh dug, is the thickest of the Bedfordshire strata; and by its peculiar property of ending by various steps, or, as it has been termed, feathering out, instead of ending at once in a bold range of hill, (as is the character of many strata to do, like the chalk and the Woburn sand, for instance,) this stratum forms the vale of Bedford, extending for several miles on the south side of that town, to the vale of Newport-Pagnell, which extends in like manner S. and S. W. of that town, to the foot of the sand hills, and most of the flats occupied by the fens of Cambridgeshire and Lincolnshire, as has been noticed by Mr Farey in the Philosophical Magazine, vol. xxxvi. p. 105; also in vol. xxxv. p. 259, where this stratum is supposed to produce alum at Whitby and other adjacent parts of Yorkshire. The great thickness of this clunch clay, of a blue or dark colour, perhaps 500 feet, and its peculiar mode of ending, occasions it to occupy near half of the surface of the county of Bedford, from near Aspley-Guise to Everton, and north-west of this. In some parts of this thick stratum, there are beds of bituminous argillaceous schist, which will burn like a very bad coal; and has given rise to an opinion in most of the counties where it ranges, that seams of coal might be discovered at greater depths; but none such exist, nor indeed any of the real indications of coal seams. Near Elston and in Goldington, coal has been suspected to exist, by those unacquainted with the subject. Other beds, very friable and black, which are found in other situations in this stratum, have been mistaken for marle, but found, on trial, to want its valuable qualities, as an ameliator of the soil. It is perhaps to the basset of these beds, that the "woodland soils" of this county are owing, whose black and friable mould would, at certain seasons, impress a stranger with the opinion of good land; but no sooner does heavy or continued rains come, than the most tenacious paste imaginable is formed; while in every drought after frost, the whole is puffed up like a sponge in lightness, and it is blown away from the roots of the corn by the wind, often to the entire destruction of the crop; and if in this state a sudden shower falls, it washes away this dust before it, into the furrows and ditches, almost in an equal degree. On these soils, and on the colder parts of the alluvial clay, particularly the steep sides of the hills, in the northern and middle parts of the country, there are perhaps 6500 acres of ancient woods, besides about 500 on the sand, and where also extensive plantations of the fir tribes have been made within the last 80 years, and within the last 20 in particular.

The Bedford limestone strata, already mentioned in speaking of that town, are the lowest which appear in Bedfordshire, unless perhaps some of the blue clay which underlays them, may appear in the extreme northern parts of the county. They consist of several compact beds of stone, with clay, sometimes whitish, but oftener dark blue or black interposed; and are laid bare, or partially cut through, by the excavation of the vale of the Ouse, from near Goldington, N. E. of Bedford town, along all its devious course, to Newport Pagnel, or a little north of it, Stoney-Stratford, and Buckingham. In Puddington, Wimmington, Melshburn, Yelding, Dean, and Shelton, the regular basset or out-crop of the Bedford limestone appears, and the excavation of the valley through Risley has also laid it bare therein.

Nearly round the town of Woburn, except on the south side, there ranges an immense fault or gulf in the sand strata, which is close filled up with alluvial clay and chalk ruins, that is in some places 100 yards wide, and goes completely through the sand at least, as is evident from the plentiful springs of water held up within it, (and which doubtless gave rise to the present site of the town,) while without this clay gulf there is dry sand to the depth of 70 or 100 feet, in wells which have been sunk. On the north of this town, and extending downwards to Crawley church and mill, there is a large tract of the strata sunk, from 50 to perhaps 200 feet in some places, below all the surrounding sand, and the clay at its north border.

The Ouse, with the Ivell, the Ouzel, and other small rivers and brooks which fall into it, form the principal waters of Bedfordshire, which is without any natural lakes or artificial reservoirs or ponds of water of any magnitude, except in the parks at Woburn, Wrest, and Chicksands. There are mineral springs at Bromham, Clapham, Cranfield, Holcutt, Oakley, Turvey, Wrest-gardens, &c. but they are little if at all used. The Ouse is navigable for boats up to Bedford, with a branch to Biggleswade, which is intended to be carried up the vale of the Ivell to Shefford, according to an act long since obtained for this purpose. The grand junction canal skirts this county for about 3 miles, near Leighton-Busard, but it can scarcely be said to enter it.

Bedfordshire is within the Norfolk circuit of judges: it is within the diocese of Lincoln, and under the jurisdiction of an archdeacon, and is divided into six deaneries, viz. Bedford, Clapham, Dunstable, Eaton, Fleete, and Shefford; Woburn parish, forming a peculiar jurisdiction under the duke of Bedford, as the lay abbot of Woburn.

It returns two members to serve in parliament, (besides the two for Bedford town,) and contains, according to Mr Lysons, 121 parishes, distributed in 9 hundreds, besides the borough of Bedford, viz. Barford, Stodden, Willey, Biggleswade, Clifton, Wixamtree, Marshead, Redbornestoke, and Flit:

he parishes are vicarages, and the great tithes
are principally in lay hands, as the possessions
uppressed religious houses.

ordshire probably contains about 275,200
its greatest length is about 36 miles, and
width about 22 miles. In the year 1801,
e population returns were made to parliament,
nty had 11,888 houses which were inhabited,
5 which were empty: the number of families
980; the number of persons chiefly employed
ulture was 18,766; persons chiefly employed
, manufactures, or handicraft, 13,816; and
to whom no occupation was assigned, and
, 28,789; the total number of resident indivi-
ing 63,393, of whom 30,523 were males, and
females. It is supposed that $\frac{1}{10}$ more of the
of Bedfordshire are serving in the army, militia,
arines, and merchants' service; and, from the
registers of baptisms, it has been calculated,
1700 the total population belonging to this
was 48,500; in 1750, 53,900; and in 1801,
persons. Whence it appears, that there are
fordshire 5⅓ persons, and $22\frac{9}{10}$ acres to each
d house very nearly. There is more than 4⅓
each person: and the persons employed in
ing the soil, are 1 in every 3⅛ of the whole
ion; and in trade, manufactures, and handi-
in $4\frac{7}{11}$ nearly.

the returns made to parliament in 1776, 1784,
03, it appears, that the amount of poor-rates
n this county, at the first period, was £18,193
in the second, £22,638 : 1 : 10; and in the
£47,484 : 6 : 7¼ per annum, making then a
about 3s. 9¼d. in the pound, on a rental of
00, or 14s. 9¼d. a head on the whole popula-
Out of the sum raised in 1803, £1175 was
ed in removals of paupers, and suits at law re-
g their settlements, with the expenses of over-
d other parish officers: also £8430 in county
d militia expenses, and for the repairs and ex-
of the churches, the expenditure by the con-
and the special rates for the repair of the high-
but not including the statute duty or corpora-
ney paid in lieu thereof. The total expendi-
r the poor being £38,070, of which £37,944
tributed to 7276 persons, being parishioners of
nty, or to 1 in every $8\frac{5}{7}$ of the individuals be-
to it, their average allowance being £5 : 4 : 5¼
y, or 2s. per week. Of these paupers, 674 were
maintained in workhouses, at the expense of
, average £12 : 10 : 5½ each, or 4s. 9¼d. per
each person. Besides the above, 761 persons
lieved, who were not parishioners, at the ex-
of £76, as is supposed. There were at that
730 persons associated in 75 friendly societies,
clubs, in the county, 16 only of which had
their rules at the quarter sessions, and made
funds disposable by the magistrates of the
; a circumstance which may perhaps be ac-
d for, from the few among the landed proprie-
ho here act as magistrates, and the important
of that office being suffered, in a great mea-
o fall into the hands of the clergy. Eight
s in this county had schools of industry, in
196 children were taught to work. In Eaton Socon, Risley, and Clophill parishes, the poor were farmed, or maintained by contract.

Bedfordshire, Bedouins.

Formerly it should seem, that wood was cultivated in this country, but it is so long since, that the name is now hardly known among the inhabitants. On the husbandry and state of rural affairs in this county, much valuable information will be found in Thomas Batchelor's *Agricultural Report on Bedfordshire*, printed in 1808. A very small portion of Bedfordshire now remains in the state of common or uninclosed. An agricultural society was established at Bedford in the year 1801, but which seems rather on the decline since 1803.

Mr Benjamin Bevan of Leighton-Busard has for some years kept a meteorological journal, which, with some account of the rain which falls about Woburn, will be found in the volumes of the *Monthly Magazine*. There is a book society at Bedford, and perhaps some others, but there is not in the county any scientific institution.

Bedfordshire, in common with Buckinghamshire and Hertfordshire, formed the habitation of the Cattieuchlani, a British tribe, whose chief was Cassivellaunus, at the time of the Roman invasion under Julius Cæsar. After the division of this island into five provinces, by the Emperor Constantine, about the year 310, Bedfordshire fell into the province called Flavia Cæsariensis. At the establishment of the Mercian kingdom it was included therein, and so continued until the year 827, when, in common with the rest of the kingdom, it became subject to Egbert king of the west Saxons. Upon the subdivision of the kingdom into shires, hundreds, and tithings, this county was formed as it at present remains. It is crossed by two Roman roads, the Watling Street, which enters it at Dunstable, and leaves it between Heath and Potsgrave; and the Ichnild way, which enters it in Eaton Bray, and leaves it south-west of Barton. At Sandy, near Potton, is a Roman encampment called Salenæ; and Maiden Bower, north west of Dunstable, is said to be another. At Totternhoe, near this, are two hills which have been fortified, and another at Ridgemont. See Britton's *Beauties of England and Wales*, vol. i; Lyson's *Magna Britannia*, vol. i; and Batchelor's *Agricultural Report on Bedfordshire*. (ς)

BEDOUINS, or BEDOWANS, the wandering tribes of Arabs that inhabit the deserts of Arabia, and other uncultivated parts of Asia and of Africa, which have been peopled from the original Arabian stock. Their name, which in Arabic is *Bedouai*, denotes wanderers, or inhabitants of the desert, being derived from *bid*, a desert. They are supposed to be descended from Ishmael, and are the legitimate representatives of the *Arabes Scenitæ*, or tented Arabians of the ancients. They never dwell in houses, but pitch their tents on spots of the desert which have springs and a little pasturage, sufficient to support their herds of camels, goats, sheep, or horses; and migrate from place to place, as their wants and inclination prompt them, taking care, however, not to encroach upon the district belonging to other tribes of the desert.

Although the Bedouins are divided into independent tribes or communities, which are frequently hostile to one another, they may still be considered as forming but one nation; as they have the same common origin, the same customs and religion, and speak the same language. Each tribe is composed of one or more principal families, the chiefs of which are called *scheiks*, or lords. Of these scheiks, one assumes the supreme command, both in war and in peace, and is sometimes called *emir*, or prince. His authority, however, is rather patriarchal than despotic; and he is desirous of extending his power, by forming alliances with the chiefs of smaller tribes, who are too weak to maintain their own independence, and whom he attaches to himself by supplying their wants. The tribes are distinguished by the names of their respective chiefs, or by that of the ruling family; and when they speak of any of the individuals that compose them, they call them the *children* of such a chief; as for example, *Beni Temin, Oulad Tai*, the children of Temin and of Tai. The tribes of the deserts of Arabia, properly so called, have descended by an uninterrupted succession from the remotest ages; but the African tribes are of less ancient origin, being posterior to the conquests in that country, by the caliphs, or successors of Mahomet.

The description of the ancestors of the Bedouins, given by Diodorus Siculus, 1800 years ago, is by no means inapplicable to their present state. "The wandering Arabs," says that author, (c. 19.) "dwell in the open country, without any roof. They themselves call their country a solitude. They do not choose for their abode, places abounding in rivers and fountains, lest that allurement alone should draw their enemies into their neighbourhood. Their law, or their custom, forbids them to sow corn, to plant fruit-trees, to make use of wine, or to inhabit houses. He who should violate these usages would be punished infallibly with death; because they are persuaded, that whoever is capable of subjecting himself to such inconveniences, would soon submit to a master, in order to preserve them. Some lead their camels to graze, some their sheep. The latter are the wealthiest; for, besides the advantages they derive from their flocks, they go to sell in the seaports, frankincense, myrrh, and other precious aromatics, which they have received in exchange from the inhabitants of Arabia Felix. Extremely jealous of their liberty, at the news of the approach of an army, they take refuge in the depth of the deserts, the extent of which serves them as a rampart. The enemy, in fact, perceiving no water, could not dare to traverse them, whilst the Arabs, being furnished with it, by means of vessels concealed in the earth, with which they are acquainted, are in no danger of this want. The whole soil being composed of clayey and soft earth, they find means to dig deep and vast cisterns, of a square form, each side of which is the length of an acre. Having filled them with rainwater, they close up the entrance, which they make uniform with the neighbouring ground, leaving some imperceptible token, known only to themselves. They accustom their flocks to drink only once in three days, so that when they are obliged to fly across these parched sands, they may be habituated to support thirst. As for themselves, they live on flesh and milk, and common and ordinary fru
have in their fields the tree which bears p
a great deal of wild honey, which they
water. There are other Arabs who c
earth. They are tributary, like the S
resemble them in other respects, except t
not dwell in houses. Such are very near
ners of this people."

The Bedouins of Arabia justly boast
dependence, since they have never been
nor have they assimilated themselves wit
tions by making conquests. The revolut
by Mahomet had little influence upon th
ing tribes; and we find the prophet, in
styling them rebels and infidels. They
adopted the Mussulman faith, but their
life, and the places in which they dwell,
secure them from foreign dominion. T
ourselves the country which they inhabi
says M. Volney, imagine a sky almost
inflamed, and without clouds; immense
less plains, without houses, trees, rivulet
where the eye frequently meets nothing
tensive and uniform horizon like the sea
some places the ground is uneven and
most invariably naked on every side, the
sents nothing but a few wild plants thinly
and thickets, whose solitude is rarely dis
by antelopes, hares, locusts, and rats.
nature of nearly the whole country, whi
600 leagues in length, and 300 in breadth,
from Aleppo to the Arabian Sea, and f
to the Persian Gulf.

The soil, however, varies considerably
places, and this variety occasions corresp
ferences in the manners and condition
douins. In the more sterile districts, th
feeble and thinly scattered. This is the
desert of Suez, that of the Red Sea, and
of the great desert called the Najd. In g
Bedouins are a small, meagre, and tawny
those who inhabit the heart of the deser
more so than those who dwell on the fron
cultivated country. When, in the time o
Daher, some of the horsemen of a remote
to visit Acre, every body viewed with su
meagre, swarthy, and diminutive race. T
ed legs were composed only of tendons, a
calves. Their bellies seemed to cling to t
and their hair was frizzled almost as much
the negroes. They, on the other hand, w
astonished at every thing they saw; the
able to conceive how the houses and min
stand erect, or how men ventured to dw
them, and always in the same spot; but
they were in an ecstacy on beholding t
could they comprehend what that might
water could be. The Bedouins who are
towns and fertile provinces, enjoy many
forts than those of the desert, and till the
well as tend their flocks. They are, how
ced, in some measure, to a state of dep
the sovereigns of the adjacent country.
Bedouins on the confines of the desert hav
ed their liberty unimpaired, and preserv

ional character in its greatest purity. Of these, the ribe denominated "Beni Khaleb" is one of the most owerful, on account of its conquests and wealth, nd the number of other tribes subjected to it. It as advanced from the desert of Najd to the sea, and onquered the country of Lachsa. The tribe of " Koab" inhabits north of the Persian Gulf, and has ossessions in the province of Chusistan, in Persia, where there are five different considerable tribes of Bedouins. The tribe "Beni Lam" dwells between Korne and Bagdad, upon the banks of the Tigris, and receives duties upon goods carried from Bassora to Bagdad; sometimes pillaging caravans. The "Montefidhi," or "Montefik," is the most powerful tribe north from the desert, with respect to extent of territory, and the number of subaltern tribes cknowledging their authority. They possess all the ountry on both sides of the Euphrates, from Kerne Ardie. In Egypt there are various tribes of Be- ins, which migrate every year from the heart of rica, after the inundation of the Nile, to profit by fertility of the country, and in spring retire again o the depths of the desert. There are others which stationary, and farm lands, which they sow, and ually change. Mr Sonnini speaks highly in praise he stationary Bedouins of Egypt. The males, he s, are in general handsome; they live to be very , and, in their advanced age, are conspicuous for espectable and truly patriarchal appearance. The men, when young, are not destitute of beauty, withstanding their tawny hue, and those disfigu- g compartments which they impress on the lower t of their faces with a needle and a black dye. found a very singular opinion prevalent with a be which he visited, which tradition had rendered red among them. They asserted, that their an- tors were Europeans, and Christians, who, having n shipwrecked on the coast of Egypt, were plun- ed, and reduced to live in the desert. The whole, wever, that they retained of the pretended Chris- nity of their forefathers, was the sign of the cross, ich they made with their fingers, or traced in the d. *Travels in Egypt*, ch. xxv.

The customs and manners of life of all the Be- uins, whether African or Asiatic, are very nearly same, and present a lively picture of the rude plicity of the pastoral stage of society. The camps the Bedouins are formed in a kind of irregular cir- composed of a single row of tents, with greater less intervals. These tents are made of goats or mels hair, black or brown, or striped black and ite, by which they are distinguished from those of Turcomans, which are white. They are only or six feet high, stretched on three or four kets, so that at a distance they appear like a mber of black spots, or mole-hills. The length these tents is much greater than their breadth; and y are entirely open on one of their long sides, be- that from which the wind most rarely blows. e tent of the scheik is distinguished from the rest nothing but a plume of ostrich feathers placed at top. Each tent inhabited by a family is divided a curtain into two apartments, one of which is ap- opriated to the women. The empty space within circle serves to fold their cattle every evening. In these tents the Bedouins, when they go to rest, stretch themselves out upon the ground, without bed, mattrass, or pillow; wrapping themselves in their hides or blankets, and lying upon a mat, wherever they can find room. They have no entrenchments, nor any advanced guards except their dogs; their horses remain saddled, and ready to be mounted upon the first alarm; but being utter strangers to order and discipline, their camps are always open to surprise, and then afford no sufficient means of defence.

The wealth of a Bedouin is extremely circumscribed. It generally consists of a few male and female camels; some goats or sheep, and poultry; a mare, with her bridle and saddle, which he prefers to a horse, because she seldom neighs, is more docile, and yields him milk, which occasionally satisfies both his hunger and thirst in the desert; add to this his tent; a lance 16 feet long; a crooked sabre; a rusty musket, or matchlock; a pipe; a portable mill; a pot for cooking; a leathern bucket; a small coffee-roaster; a straw mat, which serves equally for a seat, a table, and a bed; some clothes which are put up in leathern bags; a mantle of black woollen; a few glass or silver rings which the women wear upon their legs or arms; and perhaps a little money which he buries. The wealth of a scheik is somewhat more considerable. M. Volney resided with one in the country of Gaza, about the end of 1784, who was reckoned very great and powerful; and whose expenditure he compares to that of an opulent farmer; and estimates his effects, consisting of a few pelisses, carpets, arms, horses, and camels, at about 50,000 livres, or £2000 sterling. With such scanty possessions, and dwelling in a desert, we cannot suppose that the Bedouins live very luxuriously, or even plentifully. The greater part of them, indeed, may be said to lead lives of habitual wretchedness and famine. The length to which they are able to carry their abstinence by the force of habit and the impulse of necessity, is truly astonishing. The whole food consumed by the greatest part of them does not usually exceed six ounces a day, and that too of the simplest kind. A few dates soaked in butter, a little sweet milk or curds, will serve a man for a whole day; and he esteems himself happy when he can add a small quantity of coarse flour, or a little ball of rice. Meat is used only at the greatest festivals; and they never kill a kid but for a marriage or a funeral. The scheiks, indeed, can afford to live more generously, and have a better appearance in their persons, in consequence of their more comfortable fare; but, in times of dearth, the vulgar, always half famished, do not disdain the most wretched kinds of food; and eat locusts, rats, lizards, and serpents, broiled on briars. "An Arab," says Mr Jackson, "will go 50 miles a day without tasting food, and at night will content himself with a little barley meal mixed with cold water. The term that is applied to the richest men among the Arabs is, that they eat meat every day." *Account of the Empire of Morocco*, p. 228.

When we consider the poverty and necessities of the Bedouins, and their wandering manner of life, we shall not be much surprised at their being habitual plunderers, and formidable enemies to all who have occasion to traverse the desert. But they never murder those whom they rob, unless travellers, in their defence, should chance to kill a Bedouin; and then they are eager enough to revenge his death, and will not be satisfied without blood for blood. On many occasions, the caravans which pass at stated intervals through the territory of a scheik, pay a stipulated sum as a ransom, or safeguard; and an agreement of this kind is always religiously kept by the Arabs. The different tribes of Bedouins have frequent hostilities with each other; but their contests are seldom protracted or bloody. When the cause of offence is made known to a tribe, they immediately mount their horses, and seek the enemy; when they meet, they enter into a parley, and the dispute is frequently compromised; if not, they attack either in small bodies, or man to man. They encounter each other at full speed with fixed lances, which they sometimes dart, notwithstanding their length, at the flying enemy. The victory is generally decided at the first shock, and the vanquished fly off at full gallop, over the naked plains of the desert. The tribe which has been defeated strikes his tents, removes by forced marches to a distance, and seeks an asylum among its allies. Dissensions, however, are sometimes perpetuated by the slaughter that is made on these occasions; it being an established principle among the Bedouins, that the blood of every man who is slain must be avenged by that of his murderer. This vengeance is called *tar*, or retaliation; and the right of exacting it devolves on the nearest of kin to the deceased. If any one neglects to seek his retaliation, he is for ever disgraced; he therefore watches every opportunity of revenge; and if his enemy perishes in any other way, he seeks satisfaction by inflicting vengeance on the nearest relation. These animosities are transmitted from father to children, and never cease but by the extinction of one of the families, unless they agree to sacrifice the criminal, or purchase the blood, at a stated price, in money or flocks.

The authority of the scheik, or chieftain of a tribe, is undefined, and therefore, in some measure, arbitrary; the people, however, are consulted in all affairs of moment, and every thing is decided upon by the voice of the majority. The dignity of scheik is hereditary, but not confined to the order of primogeniture; the petty scheiks, who form the hereditary nobility, chuse the grand scheik out of the reigning family, without considering his immediate relationship to his predecessors. Little or no revenue is paid to the grand Scheik; in fact, his dignity subjects him to a very great expense; for he defrays the charges of all who arrive at or leave the camp. Adjoining to his tent is a large pavilion for the reception of all strangers and passengers; and in which are held the assemblies of the principal men to determine upon all important affairs. Here he entertains his guests with coffee, bread baked on the ashes, rice, and sometimes roasted kid or camel; the females of his family performing with their own hands the office of preparing the repast. On his generosity and hospitality, depend, in a great measure, his credit and his power; for hospitality is a virtue in the highest degree prized by the necessitous Bedouin. So rapacious without his camp, he no sooner arrives there, than he becomes liberal and generous. The little he possesses, he is ever ready to divide. When he takes his repasts, he seats himself at the door of his tent, order to invite passengers; a generosity which does not consider as a merit, but merely as a dut and he, therefore, readily takes the same liberty w others. The rights of hospitality with the Bedoui include also the rights of asylum, and of friendshi If the Bedouin has consented to eat bread and s with his guest, nothing in the world can induce h to betray him. Nay, should a stranger, or even enemy, but touch the tent of a Bedouin, from that i stant his person becomes inviolable. It would be recko ed a disgraceful meanness, an indelible shame, to sati fy even a just vengeance at the expense of hospitality

In this sacred regard to the rights of hospitalit and in various other particulars, the character of th Bedouin nearly resembles that of the savages North America. The Bedouin, however, has thing of the ferocity of the native American; though frequently experiencing the extremity hunger, the practice of devouring human flesh is terly repugnant to his nature; and he neither to tures, nor puts to death the captives that fall into h power. The occupations of the Bedouin, who is necessity a shepherd, as he dwells in regions wh there is no employment for the hunter or fisherm tend to foster in him this superior degree of huma ty; while those of the American, who busies hims entirely in the pursuit and destruction of game, courage rather an unfeeling and sanguinary dispo tion of mind.

In many particulars there is a singular resembla between the character and manners of the Bedoui and those of the Scottish Highlanders, at the peri when the feudal authority of their chieftains existed i full vigour; and the clans chiefly occupied themselv in a predatory warfare upon one another, or upon th more peaceful inhabitants of the low country. W happen to have access to some interesting reports r specting the state of the Highlands, made in th years 1724, 1725, and 1727, by the celebrated Gen ral Wade, which we believe have never yet been pub lished, although they contain much curious observ tion. It will, doubtless, gratify our readers to be fur nished with an extract from these reports, by whic they may estimate the justness of the parallel whic we have drawn between the character of the wil Highlander and that of the wild Arab.

"The Highlanders," says General Wade, "a divided into tribes or clans, under lairds or chieftai (as they are called in the laws of Scotland;) eac tribe or clan is subdivided into little branches spru from the main stock, who have also chieftains ov them; and from these are still smaller branches fifty or sixty men, who deduce their original fro them, and on whom they rely as their protectors an defenders. The arms they make use of in war are, musket, a broad sword and target, a pistol, and durk or dagger hanging by their side, with a powde horn, and pouch for their ammunition. They for themselves into bodies of unequal numbers, accordin to the strength of their clan or tribe, which is com manded by their respective superior or chieftai When in sight of the enemy, they endeavour to po sess themselves of the highest ground, believing th descend on them with greater force. They gener ire at a distance, then lay down their round, and make a vigorous attack with ords; but, if repulsed, seldom or never They dread engaging with the cavalry, nture to descend from the mountains, nsive of being charged by them.

en alarms, or when any chieftain is in give notice to their clans, or those in alem, by sending a man with what they *cross*, which is a stick, in the form of a the end,—who send it forward to the lan. They carry with it a written pa- them where to assemble; upon sight leave their habitation, and with great pair to the place of rendezvous, with tion, and meal for their provision.

osition commonly called *black-mail*, is Highlanders on almost all the low coun- thereon. But as it is equally criminal by Scotland to pay this exaction, or to exabitants, to avoid the penalty of the ith the robbers, or some of their corre- e lowlands, to protect their houses and e in effect but their stewards, or factors; s this payment continues, the depreda- on their lands; otherwise the collector imposition is obliged to make good the sustained. They give regular receipts afe-guard money; and those who refuse his imposition are sure of being plun-

o are robbed of their cattle, (or persons them,) follow them by the tract, and them from the robbers, by compound- in sum of money agreed on. But if the armed, and in numbers superior to the happen to seize any of them, they are ver prosecuted, the poorer sort being port the charge of a prosecution. They nder the apprehension of becoming the r revenge, by having their houses and their cattle stolen or hockt, and their erey of the tribe or clan to whom the g. The richer sort (to keep, as they ighbourhood,) generally compound with of the tribe or clan for double restitu- e willingly pays to save one of his clan ion; and this is repaid him by a con- n the thieves of his clan, who never re- ent of their proportion to save one of their y. This composition is seldom paid in cattle stolen from the opposite side of the ake reparation to the person injured."

ion of the Bedouins owes some of its l comforts to the camel, an animal seems to have expressly designed for in- desert, and enduring the hardships and ich are inseparable from such a mode of f a form muscular and robust, without perfluous flesh to support: on his legs find absolutely nothing but the muscles for motion. He is furnished with a hat he may grind the hardest aliments; raitened and ruminating stomach, that he me too much. His foot is lined with a lump of flesh, which, sliding in the mud, and being in no way adapted to climbing, fits him for a dry, level, and sandy soil like that of Arabia. Nature has also evidently destined him to slavery, by refusing him every sort of defence against his enemies. To preserve the species, therefore, she has concealed him in the depth of the vast deserts, where the want of vegetables can attract no game, and whence the want of game expels every voracious animal. Here his abstinence enables him to support his strength on the scanty herbage which the arid soil produces; and he is capable of existing without water for several days together. Reduced to the domestic state, he has rendered habitable the most barren soil that the world contains; and is alone sufficient for all his master's wants. The milk of the camel nourishes the family of the Arab, under the various forms of curd, cheese, and butter; and his flesh furnishes a repast upon extraordinary occasions. Slippers and harness are made of his skin, tents and clothing of his hair. Heavy burdens are transported by his means; and when the earth denies forage to the horse, the camel, for so many advantages, seeks no other recompense than a few stalks of brambles or wormwood, and pounded date kernels.

The ordinary rate of motion of the camel greatly exceeds the journeying pace of the horse; but there is a peculiar species called the *desert camel*, of which the velocity is so great, as almost to exceed credibility. Mr Jackson, in his recent account of Morocco, has given the following account of the desert camel of the Sahara, in Africa. "Nature, ever provident, and seeing the difficulty of communication, from the immense tracts of desert country in Sahara, has afforded the Saharanans a means, upon any emergency, of crossing the great African desert in a few days. Mounted upon the *heirie*, or desert camel, (which is in figure similar to the camel of burden, but more elegantly formed,) the Arab, with his loins, breast, and ears bound round, to prevent the percussion of air proceeding from a quick motion, rapidly traverses, upon the back of this abstemious animal, the scorching desert, the fiery atmosphere of which parches and impedes respiration, so as almost to produce suffocation. The motion of the heirie is violent, and can be endured only by those patient, abstemious, and hardy Arabs, who are accustomed to it. The most inferior kind of heirie are called *talatayee*, a term expressive of their going the distance of three days journey in one; the next kind is called *sebayee*, a term appropriated to that which goes seven days journey in one, and this is the general character: there is also one called *tasayee*, or the heirie of nine days; these are extremely rare." p. 39, 40. The swiftness of this useful animal, Mr Jackson informs us, is thus described by the Arabs in their figurative manner. "When thou shalt meet a heirie, and say to the rider *Salen-Aick*, 'peace be between us;' ere he shall have answered thee, *Alick-Salem*, 'there is peace between us,' he will be afar off, and nearly out of sight, for his swiftness is like the wind."

The arts of the Bedouins are few and simple, and consist in weaving their clumsy tents and clothing, and in making mats and butter. They preserve their butter in leathern bags, and their water in goat skins. Their hearth consists of a hole in the ground, laid with stones, and covered with an iron plate, on which they bake their bread, made into small cakes. In their excursions they carry with them a supply of meal; and their other provisions are, dates, milk, cheese, and honey. Their whole commerce extends only to the exchanging of camels, kids, stallions, and milk, for arms, clothing, a little rice or cotton, and some money, which they bury. They are totally ignorant of science, and nothing is more uncommon among them than to know how to read. Their only literature consists in singing love-songs, or in reciting tales and histories, in the manner of the *Arabian Nights Entertainments*. For such stories they have a peculiar passion; and in the evening they seat themselves on the ground, at the door of their tents, or under cover, if it be cold; and there, ranged in a circle, round a small fire of dung, with their legs crossed, and their pipes in their mouths, after indulging for some time in silent meditation, they amuse themselves with the recital of tales of this kind. They profess the religion of Mahomet, but are far from being strict in the observance of its ceremonies, or fervid in their professions of devotion. They excuse themselves for this laxity, by demanding, "How shall we make ablutions, who have no water? How can we bestow alms, who are not rich? Why should we fast in the Ramadan, since the whole year with us is one continued fast? And what necessity is there for us to make the pilgrimage to Mecca, if God be present every where?"

We shall conclude this account of the Bedouins, with extracting from the Travels of Sonini in Egypt, a very lively and interesting detail of a rencounter which that traveller had in the desert with a troop of these marauders, in consequence of which he had an opportunity of seeing the peculiarities of their character in a very striking light. He was on his way from Alexandria to Cairo, under the guidance and safeguard of Hussein, who was scheik of a tribe of half civilized Bedouins stationed not far from Alexandria, and had entered the desert which skirts the famous lakes of natron. "I staid some days," says our traveller, "near the lakes, the borders of which I traversed; at length we resumed our journey, continuing our course to the south-west. The sand over which we travelled was completely covered with hardened natron, which rendered our progress toilsome and fatiguing, both to us and our beasts. We arrived within a short distance of a large square edifice, in which a few Coptic monks live shut up from the world. I do not think that there is upon earth a more horrible or repulsive situation than this sort of convent. Built in the midst of the desert, its walls, though very lofty, are not distinguishable at any considerable distance from the sand, of which they have the reddish tinge, and bare aspect. There is no apparent entrance; no tree, no plant of any height, is seen around it; no path leads to it; no trace of human footstep is observable in its vicinity; and, if a few be imprinted, they are soon covered by the sand, or obliterated by the tread of wild and ferocious beasts, the proper inhabitants of these frightful solitudes.

"We were about 500 or 600 paces from this dungeon. Hussein had advanced before us, to obtain our admission into the convent, which is to be procured with difficulty. I was some way from him, and the rest of our company was at a considerable distance. A troop of Bedouins, on horseback, suddenly issued from behind the walls. At first I did not distinguish them, amid the clouds of dust they raised; but, as soon as they were discernible, I perceived both their number, and what they were. Instantly I turned about my horse's head, and, being mounted on an excellent courser, which carried me with too much speed for them to overtake me, soon joined my companions, who had likewise perceived the troop from the backs of their camels. I found them on foot, drawn up in a close body; leaped off my horse; and exhorted them to defend themselves with vigour. We were six in all, but on three of the number little dependence was to be placed. From two of the natives of the country we could not expect much; and the draughtsman, young and inexperienced, scarcely knew how to fire a gun.

"The firmness of a handful of men, alone in the midst of a sandy plain, and exposed on all sides, checked a squadron of Bedouins amounting to near a hundred. Though they came towards us at full gallop, they stopped suddenly about a hundred paces off, and cried out to us not to fire. I answered with telling them not to advance. For some moments they remained in a sort of hesitation, during which we observed them consulting together; at length they separated into four bands, three of which set off at full gallop, and stationed themselves on our flanks and in our rear. This manœuvre, which it was impossible for us to prevent, disconcerted my two soldiers; and all that I could urge was incapable of prevailing on them to resolve to stand on their defence. We had good fusils, and a considerable quantity of cartridges. I knew that the Bedouins would take flight, as soon as they saw a few of their party drop; and I was certain, that our first fire must bring down several. It is true, I did not consider that we were in the midst of a vast solitude, and that, if our enemies had fled, it would only have been to return again speedily by thousands, overpower us by their numbers, and massacre us all, in revenge for the death of their comrades. I flung down my fusil with vexation at being forced to yield to such robbers.

"They were soon upon us, and, without taking time to alight, pillaged us in the twinkling of an eye. Money, arms, effects, garments, provisions, were [illegible] taken. They left me my long under vest and [illegible] breeches; my companions were stripped of everything but their shirts. My turban had been taken [illegible] my head, shaved and bare, was scorched by the fervency of the sun, and ached intolerably. I covered it as well as I could with both my hands, but this would not alleviate the pain. The spoil was spread out upon the sand; a score of Arabs on foot, whom we had not perceived, as they had concealed themselves behind a heap of stones, joined the others; and they all fell to dividing the plunder, not without obstreperous disputes.

"Our different situations would have formed [illegible] striking subject for a picture, under the hand of [illegible]

artist. In one place you might have seen, dis-
ng over the booty, the band of robbers, covered
dust, some of black, others of tawny com-
ions, and their countenances dried up like the
s, which their robberies render still more dismal:
he midst of them my old servant, coolly endea-
ing to recover from them some small portions of
spoil, and occasionally dealing a blow with his
to attain his object. In the fore-ground, the
adier, motionless and disconcerted; the two
ptians staring stupidly on each other; me, at a
nce, biting my fingers, with a look of indigna-
and chagrin; and, in the last place, the draughts-
, crying bitterly, and answering me with sobs,
n I went up to him, to ask him if he had recei-
any hurt: 'No, sir, but what shall we get to
now?'

Tired of being the spectator of a scene in which
as useless for me to take a part, I proceeded to-
ds the monastery, hoping to find Hussein, who
repaired thither; when I heard myself called, and
ently felt myself seized by the arm. It was the
f of the robbers, an Arab of the desert of Nubia,
his face was as black as a negro's. He led me
, without saying a word, into the midst of the
p. I imagined that he was desirous of the gar-
ts they had left me, or that, on deliberation, he
resolved to take away my life. How great was
surprise, when I found this chief carefully inqui-
what clothes and effects belonged to me; and,
having acted as my valet-de-chambre a little too
ghly in undressing me, now taking upon himself
same office, but with more civility, in assisting
to put on the different parts of my dress; re-
ing me my purse, and restoring my arms! Other
ouins performed the same office to my compa-
s, equally astonished at so singular and unexpect-
n adventure.

This was the fruit of Hussein's spirited conduct.
ile he was near the walls of the convent, to which
ad repaired with his fusil slung over his shoulder,
e of the Arabs set off to detain him. They had
ed his arms; but Hussein, after a long dispute,
ceeded in getting up behind one of the Bedouins,
being conveyed to the place where the whole
p was, "Arabs!" said he, addressing himself to
chiefs, "you have stripped a man confided to
protection, and for whom I have pledged my own
; a man with whom I have eaten, who has slept
r my tent, and who is become my brother. I can
r again enter that tent; I dare not shew my face
in the camp; I must renounce the pleasure of
more embracing my wife and children. Arabs,
away my life, or restore all that belongs to my
er." This speech, which was accompanied
a look of firmness and a tone of resolution, made
impression on the minds of the Bedouins. Hus-
ad snatched his fusil out of the hands of him
held it, and, while waiting till they had taken
resolution, presented it to the chief commander
e robbers, determined to shoot him in case of a
l, and thus expose himself to be massacred, ra-
han consent to our suffering the least injury.
onductor was well known; they were aware,
is resolute character would lead him to carry his threats into execution; thus, partly through fear, partly through deference, the black chief consented to restore all that was taken from me; and this was done with truly admirable fidelity. It is true, every thing that appeared valuable in the eyes of him who had taken it, required to be particularly claimed; but when the chief insisted upon it, it was produced; and this discipline among people, and in a place where we could not have expected to find an instance of it, appeared to me highly astonishing. The chief came to ask me what was missing still; on my naming an article, he mounted on a little eminence, and cried, "Arabs, such a thing is not restored; let it be brought." If the person who had it was not prompt in his obedience, he added, "Come, Arabs, no delay;" and it was delivered to me immediately. The chief then mentioned an other article that had been stolen, and it was restored to me in the same manner.

Bedouins.

"Two hours were thus spent before the inventory of my effects was gone through. Every thing was restored to me except my money, of which I received only a small part. This, however, was not the fault of the two scheiks. Hussein, in particular, insisted on my counting in his presence the sequins that had been returned. The Arabs, to whom my purse appeared a good prize, and who had shared the chief part of its contents, waited till I had finished counting them with some uneasiness, which was quickly removed on my declaring that I had all my money. Thinking myself happy to come off so well, I had voluntarily sacrificed two-thirds of what I possessed, that I might not incur the hatred of the honest robbers that surrounded me, and expose myself to their vengeance. These banditti thought it not sufficient to appear just, they would also be polite. The chief brought me his horse, and insisted on my mounting it, to ride the little distance from the place we were to the monastery, while he attended me on foot. Some others of the Arabs paid the same respect to my companions, each of them walking, in like manner, by the side of his horse. When we came near the walls, we saw some baskets of bread, and wooden dishes of lentils, let down by ropes. Seating ourselves on the ground, in a circle, we ate up this provision with people who just before were our enemies. After our repast was finished, some of them came up to me with frankness, and even with a sort of cordiality, thanking heaven that no injury had befallen me; with a tone of concern for my temerity in travelling through a desert, which, by their own confession, was the resort only of thieves and robbers. Above all, they did not forget to say their prayers with great devotion, after they had rubbed their arms and legs with sand, for want of water, to perform the ablutions prescribed by their law. Mahomet, an Arab himself, was aware of the circumstances to which his followers would frequently find themselves in the desert, and accordingly directed them to make use of sand instead of water.

"I learned afterwards, that these Arabs had been informed of our journey, and that they had watched our steps from its commencement. They had been under the walls of the monastery ever since three o'clock in the morning, and had acquainted the monks, that they would have a visit from some Franks

Bedouins. in the course of the day. To the very moment when they perceived us, they had been concerting the manner in which they might attack us with least risk; for they were not without apprehensions, as they knew that we were well armed." See Sonini's *Travels in Egypt*, c. xxvii. See also Volney
in Egypt and Syria; Savary's *Letters*
Neibuhr's *Travels through Arabia, &c.;*
son's *Account of the Empire of Morocco.*

BEE.

Bee. This is a very numerous genus of insects, on which we have already made some general remarks under the article Apis, the generic name. Here we shall confine our observations chiefly to the honey bee, (*Apis Mellifica,*) treating, in the first place, of its nature and properties; and, secondly, laying down those rules which must guide the cultivator in his views to convert the labours of the animal to his own advantage. It is indispensible, however, that he should previously become acquainted with the natural history of the bee, otherwise he will often find his object fail without being able to assign a reason; and if he does render himself master of it, he will remedy many unexpected disasters by simple and unerring expedients.

Bees have attracted an uncommon share of attention in all countries, and in every age. Their minuteness, numbers, habits, and the luxuries we derive from their united industry, have, from periods of the most remote antiquity, been the fertile source of admiration. Hence have resulted innumerable inquiries, as well for the elucidation of science, as for personal gratification and pecuniary advantage. But, unlike those subjects on which long and patient investigation are bestowed, the obscurities attending the nature of bees seemed to increase in proportion to the observer's anxiety to unveil them, and, at the end of many years, few indisputable facts have been ascertained by individuals. Errors have thence accumulated on errors; imagination has magnified deceitful appearances into certainties, by which even experienced naturalists have been deluded; and most of the treatises published, under the pretence of instructing, serve only to lead the unskilful into the belief of absurd and fallacious doctrines. Nevertheless there are some good authors, who have seen without prejudice, and have related without exaggeration, such as Swammerdam, Maraldi, Reaumur, Bonnet, Schirach, and Huber. We shall avail ourselves of their observations, and endeavour, from these, and our own practical remarks, to select what has been fixed by experiments, rejecting the fabulous accounts of others.

History of the honey bee. I. Natural History and Economy of the Honey Bee.—The honey bee is either wild or domesticated, and consists of numerous societies, composed of from 10,000 to 30,000, perhaps 40,000 or 50,000 individuals. In the former state, it inhabits the woods, in clefts of trees, and, it may be, the cavities of rocks also: in the latter, it is kept by us in wooden boxes, or coverings of straw or osiers, commonly called *hives* in English, but more definitely *skeps* in the Scottish language, or old English: for, strictly speaking, *hive* signifies the cover
colony; and *swarm*, that portion of the
leaves the parent stock at a certain sea
year, before it is lodged under our care.
by which we understand the whole colon
three different kinds of bees; females,
workers. The females, of which not
one can ever live in all the great popu
hive, are called *queens;* the males, of
are hundreds, and sometimes thousands,
drones; and the remainder are denominat
or *neuters*, from being supposed to belong
sex. They are the operative part of the
ty; for, while the female gives birth to
young, and the males perform no functio
petuating their race, the workers collect
form the wax, build the combs, watch
growth of the young, and supply their ne

We shall not dwell on the anatomy of th
cerning which Swammerdam and Reaum
largely written; but the use to which the
convert some of its organs, requires a brie
tion of their structure. A bee has four
six legs: its abdomen consists of several
lar rings, connected by membranes; the la
with a sting: and the head is provided
boscis, and two mandibles, in addition to a
which the animal has likewise. The bod
covered with hair, which is not to be co
indifferent character; for each separate h
with the microscope, appears a plant in
with a stem and branches; and the small
pollen, shaken off by the motion of a bee
are arrested by the hairs, and then collecte
lets with its limbs. In the third pair of
is a small hollow, to which the pellets are
part of the second pair is provided wit
semble brushes, for brushing off the pol
proboscis is the principal organ employed
ing the honey; when inactive, it is folded
head, and defended by a scaly sheath, or
When employed, it is extended, and the
parently licks the honey from the flow
mouth, which is of considerable size, a
transmits it to the stomach. All the ho
we see in combs is a vegetable product. A
swallowed by the bees, it is disgorged into
but its scanty quantities in the natural st
us from ascertaining what change is underg
stomach. Until very lately, it was believe
bees also swallowed the wax, and disgo
construct the cells; and, when so disgorg
had the property of indurating, like the

forming silk, immediately on exposure to the air; and that the mandibles were used in moulding the parts to their proper size and thickness. It is now proved, that wax is made out of honey, which is swallowed by the bees indeed, but there is great reason to believe that it then transudes through the membranes connecting the rings of the body in the form of wax. The females and workers have a sting, of which the males are destitute. This is not a simple sharp-pointed weapon, as apparent to the eye of a superficial observer; it consists of two separate portions, applied longitudinally against each other. The external side of each is provided with several barbs, like those of a dart, which prevents the retraction of the sting from the wound it has inflicted, until the purpose of its penetration, the discharge of poison, be fulfilled. These barbs, it is said, may be elevated and depressed at the will of the animal. Having satisfied its vengeance, the sting is withdrawn; but if the bee is suddenly forced away, the barbs remain elevated, and retain the sting in the wound. The extraordinary pain attending so small a puncture, arises from a liquid, which is genuine poison, flowing into the wound from an oval bag, or reservoir, in the body of the animal, connected with the sting; and its virulence is such, as even to occasion death, if the stings be numerous. In experiments where a small portion of the poison was introduced into a slight puncture with the point of a pin, acute pain followed; and, on laying the smallest quantity on the tongue, a sweetish taste first was sensible, which became burning and acrid, and continued so several hours. The effect of the poison is various on different people; in some, a single sting occasions violent swelling and inflammation; others suffer little inconvenience from it. If the sting be left in the wound, its vital powers will force it still deeper; therefore it is cautiously to be extracted, and the part sucked and washed with vinegar, or some liquid fit to allay inflammation, that being probably the only effectual mode of cure. We cannot readily ascertain the real use of the sting to bees. It is vain to affirm, that it is an organ of defence against enemies; that the treasures of a hive are particularly exposed to depredation, and require great protection. Many other insects, in similar circumstances, have no defensive weapon; many possess it which we can hardly say have any thing to guard; and some, exposed to numerous accidents, are entirely unprovided with the means of averting them. The sole purposes to which we see the sting applied, independent of the resistance of injury, are massacring the drones of the hive; and by queens, to effect their mutual destruction. Queens are more pacific than the common bees, and less inclined to sting the person that handles them.

The three kinds of bees inhabiting a hive are all of different size and appearance, and may easily be recognised. The common bees and males are familiar to every one; the latter being much larger, and of duller flight. But the queen resembles neither in structure; she is about eight lines and a half in length, while the males are seven, and the workers six. Her abdomen is greatly longer in proportion, and increases much when filled with eggs; her wings are so short as scarcely to reach past the third ring, and her colour tends to a deeper yellow. Queens, and also males, are occasionally seen of smaller size than usual; which naturalists have supposed is owing to accidental circumstances. It is not yet known, however, whether all the bees preserved in hives, in different countries, are exactly of the same species; or, whether there are varieties preserving their peculiar characteristics of size and colour.

Propagation.

Long ago it was ascertained, that the welfare of the queen is indispensible to the welfare of the hive, and that any accident befalling her is fatal to the whole colony. As she is the parent of the hive, it is from her alone that a complete swarm, composed of queens, drones, and workers, can proceed; and without all these different members of the community, it cannot either lay up stores, or be preserved in existence. That bees are propagated by means of eggs, which are hatched into worms, could not be unknown from times of the most remote antiquity; but no point in the natural history of animals has been more keenly contested, than their precise mode of generation. It was concluded, from finding males and females together in the same hive, that their sexual union gave birth to the young; yet no one had beheld their concourse. Those provided with the means best adapted for observation, could only assert, that something like an indistinct and transient junction had taken place before them. Others, again, with all the assiduity, care, and attention they were able to command, could see nothing of the kind; and thence inferred, that the queen was a real hermaphrodite, which in itself possessed the generative powers of both sexes combined. A third class, where we are surprised the name of Swammerdam should appear, ascribed the impregnation of the queen to a certain *aura* emanating from the bodies of the males, which must necessarily be numerous, in order that it may have sufficient power; and a few observers conceived, that external fecundation of the eggs took place after being deposited in the cell, in the same way as the generation of frogs and fishes is effected. But, on the other hand, young were found in hives provided with queens, though entirely destitute of males. They were seen in spring long before males begin to exist, and in winter after the whole are destroyed; and an experiment by Hattorf evinced the aversion of queens to drones, rather than an affection for them. He took two virgin queens from their cells, and confined each, along with two drones taken from the same hive, under a glass vessel. One of the drones having approached a queen, was seized by her, and killed on the spot; and the other did exactly the like with one of her companions; the two remaining drones escaped. This experiment, on frequent repetition, presented similar results; and the variety of devices to ascertain the fact were attended with consequences which served still more and more to perplex the observer. At length, however, the truth seems to be disclosed, and we shall briefly advert to the methods adopted for the purpose of discovering it.

M. Huber of Geneva, one of the most intelligent authors who have written on this subject, finding the experiments of all former naturalists unsatisfactory, removed the whole reigning females from a number of hives, and substituted for each a queen taken at the moment she came to maturity. He then divided the hives into two classes; and having removed all the drones from those of the first class, he adapted a glass tube to the entrance, so narrow that no drone could pass, but large enough to admit common bees. The whole drones were allowed to remain in the hives of the second class, and more were even introduced. A glass tube, also, too small for their exit, though of sufficient capacity for common bees, was likewise adapted to the entrance of the hives. This experiment was carefully made; and, to the author's great surprise, all the queens remained sterile; thus proving, that a female confined to her hive would continue barren while amidst a seraglio of males.

Sexual union takes place.

The result of successive experiments, diversified in every possible manner, and made with much skill and indefatigable labour, proved, that the generation of bees is effected by the union of the sexes, as in most other species of insects, and the larger terrestrial animals. But it is never in the interior of the hive that it takes place. The queen, to accomplish it, must issue forth from her dwelling—the only occasion, except one, on which she leaves it; and although her junction with the drone has not yet been witnessed by human eyes, it is supposed to happen high in the air. In illustrating the generation of bees, the author whom we have already named concluded, that if queens were obliged to go out for impregnation, it would be at the warmest time of the day, as the males then leave the hive. On the 29th of June, a hive, containing a virgin queen five days old, was made the subject of observation. The sun had shone from his rising; the air was very warm; and, at eleven in the forenoon, the males began to leave the neighbouring hives. The entrance of the one containing the queen was then enlarged, and the bees entering and departing narrowly observed. The males appeared, and immediately took flight; and soon afterwards the young queen came to the entrance. Before quitting the board, she traversed it, and brushed her belly with her hind legs, during which she received no attention either from the males or workers. Taking flight, she again approached the hive as if to examine the place of her departure, that she might recognise it. Next, describing circles ten or twelve feet above the surface of the earth, she rapidly rose in the air, and was soon out of sight. The observer and an assistant hastened to contract the entrance of the hive, and in seven minutes the young queen returned. No external marks of fecundation being visible, she was allowed to enter the hive. In a quarter of an hour she came to the entrance, and brushing herself as before, took flight. Returning to examine the hive, she departed, rising so high that the observers soon lost sight of her. Twenty-seven minutes elapsed before her second excursion terminated; but now she was in a very different condition from that in which she appeared after the first; for she exhibited the most unequivocal evidence of sexual union, by bringing along with her the genital organs of the male by which she had been impregnated.—And here a wonderful deviation from the ordinary laws of nature ensues; the male loses his organs in copulation, and thus sacrifices his own life in perpetuating his race. In two days the belly of the queen was swollen; and, on investigation, she proved to have laid nearly an hundred eggs in the workers' cells. For some reason, which is unknown to us, the sexual union cannot be accomplished in the hive; and the object of the queen's departure being once fulfilled, she never again leaves it unless to conduct a swarm.

Forty-six hours after impregnation the queen begins laying eggs, which will become workers; and provided impregnation takes place within the first twenty days of her existence, thousands are produced uninterruptedly during the succeeding eleven months. Then she commences laying eggs which will be drones. But should matters be otherwise arranged; should her impregnation, either from constraint or accident be delayed more than twenty days beyond her own complete metamorphosis, a singular alteration takes place. She begins laying within forty-six hours of its occurrence, but no eggs excepting those from which drones proceed; nor will she lay any other kind during her whole life. A nice and difficult problem thence arises, which analogy does not aid us to solve. How is the order of nature so completely inverted by retarded impregnation? The eggs producing males require, in the natural state, eleven months to attain maturity; but, under the effects of this accidental occurrence, they reach perfection in forty-six hours. Those eggs which should have preceded them, during eleven months, in many thousands, totally disappear, and from no other sensible cause. Some vitiation has ensued, which, while it destroys the vitality of which the workers' eggs are susceptible, operates such a change, as to bring those of the males eleven months earlier to maturity. On reflecting that a simple copulation is sufficient to impregnate all the eggs which a queen will lay in two years, or, perhaps, the whole that she will lay during her life, the question becomes still more embarrassing. Without being aware of the cause of such peculiarities, some observers have maintained, that there were certain species of queens, from which no description of bees, excepting drones, would be generated; which they justly determined was extremely injurious to their respective colonies.

The laying of a queen is retarded, or altogether interrupted, by cold; and one impregnated in the end of October has been known to retain her eggs four months and a half, owing to the intervention of winter. This queen, during March and April, laid about 3000 eggs, producing males only; and so very prolific are these insects, that a single queen may be the mother of 12,000 bees, or more, in the space of two months, which is laying at the rate of 200 eggs daily. The queen before depositing an egg, examines whether the cell is clean and fit to receive it, and also suitable to its future state; for queens, males, and workers, have cells peculiarly adapted to their kind; and the queen, by anticipation, seems aware which of these will proceed from the egg she deposits. Those producing workers are deposited in common horizontal cells; but the cells containing the eggs which will be transformed into queens are large and rudely constructed with a great quantity of wax, and hang per-explain the cause of that fertility, which is at times, though rarely, seen in workers. These workers they suppose to have inhabited cells in the immediate vicinity of royal cells, during the earlier part of their own existence. Particles of the food appropriated for queens having accidentally fallen among what was destined for the common worms, produces a partial change in particular organs. Though under its influence, the ovaries are but imperfectly expanded, and also labour under a vicious conformation, which unfits them from propagating any eggs excepting those transforming to drones. We cannot subscribe to these doctrines, which proceed from the most intelligent naturalists of the present age, because they are unsupported by experiment. The subject is to us still wrapt in mystery; nor is it to be aided by any fact with which we are acquainted in the generation of animals. Perhaps it affords some reason for believing, that the germs of all animals are of one sex only, it may be of no sex, but possessing organs susceptible, in certain cases, of a different kind of evolution. We are indebted to Schirach for the original discovery of this property enjoyed by bees, which has subsequently been confirmed by other observers.

Perfect state of bees.

These being the imperfect stages which bees undergo, and their ultimate transformation being completed, three different kinds, females, males, and workers, whose offices, nature, and properties, are also different from those of each other, inhabit the same swarm. In common with other insects, they are of a lighter colour at the moment of issuing from the cells, and totally covered with hair, which is less abundant on the queen. The quantity of it seems to diminish with their age: it is not known how long they survive, but most probably above one or two years, or considerably more. The queens and drones of smaller size, sometimes found in hives, are regarded as aberrations from the general race. Their nature has not hitherto been fully illustrated; but naturalists have ascribed this diminution to the eggs producing them having accidentally been laid in wrong cells: that their organs are there cramped and confined, and prevented from attaining their due expansion from the smallness of the cell. At the same time, though the eggs producing workers are laid in cells of greater than ordinary size, the reverse does not ensue, and the body is still restrained to its natural dimensions. Schirach obscurely hints his opinion, that the greater length of the queen is owing to the greater length of her cell.

We shall next explain the peculiar office and functions of each species of bees, the queens, drones, and workers, in their perfect state, and shew the mutual relation that must subsist among them, in order to ensure the welfare of the community. In the history of other insects, nothing more is taken into consideration than a general view of the structure, habits, and perpetuation of the race. But in treating of bees, we have not only to enter on the origin of each variety in a hive, to follow it through its successive stages until gaining perfection, to examine that internal œconomy which the instinct of many thousand individuals regulates; but we have to shew the cultivator, who designs converting their labours to advantage, how their nature operates separately as well as combined.

The sole functions of the queen bee are to perpetuate her species; but single and unassisted by the workers, herself and her offspring would perish. Her fecundity is surprizing. Swammerdam affirms, that she contains 50,000 eggs; and some authors advance, that she may be the mother of 100,000 bees in one season. In addition to the peculiarities exhibited in her propagating young, she is marked by others of the most conspicuous description. She is watched and attended to; and, to judge from appearances, sheltered and respected by the workers. Groups of them constantly encircle her; they supply her with honey, brush and lick her limbs; whenever she moves, they recede before her; and, according to the united sentiments of all who have studied the nature of bees, pay her what would be called real homage, could we allow them the prerogative of understanding. She is an object of the greatest attachment; her presence inspires them with new instincts, and animates them to labour: the permanent existence of a queen, is short, is the only security of the workers. Excepting when she leaves the hive for fecundation, they cluster around her; and hence some persons have endeavoured to impose on the credulous, as having a command or power over bees. It is true that such persons could make a whole swarm follow them from place to place without injury to themselves or the spectator; but the sole secret consisted in their having obtained possession of the queen. The natives of foreign countries are acquainted with this attachment of the workers to their queen, which some years since was exhibited in Britain under mysterious disguise, as Labat, long ago, relates in his Travels. He received a visit from a man who called himself *master of the bees*. "It is certain they followed him as sheep do their shepherd, and even more closely. His cap in particular was covered in such a manner, that it exactly resembled those swarms which, in endeavouring to settle, fix on some branch of a tree. Being desired to take it off, he did so, whereupon the bees settled on his shoulders, his head, and his hands, without stinging him or those in the vicinity. All followed him when he retired; for besides those which he carried about, they attended him in legions. People accustomed to handle bees with address, can easily seize the queen, and then, as during swarming, little is to be apprehended from the bees attempting to sting; they are too much occupied in regarding their queen.

Though the queen lays several eggs, which will be successively transformed into queens, only one in its perfect state can exist in a swarm: a plurality seems equally adverse to the intention of Nature as a [illegible] defect. Hence it follows, that of two coming at the same time into existence, one must die for the welfare of the community. But the charge of accomplishing the destruction of the victim is not confided to the common bees; the queens themselves are entrusted with it. Were it otherwise ordained, dangerous consequences might be the result; for while one group of bees destroyed the first of two queens, another might massacre the second, and the hive [illegible] workers and males, spin complete coccoons close at both ends; the coccoons of queens are imperfect, covering only the head, thorax, and first ring of the abdomen. Nor can the larvæ do otherwise; the particular form and position of the cell force it to leave the ends of the coccoon open, while in the natural state; but if removed from it, and situated in the same circumstances as the larvæ of males and workers, a complete coccoon is fabricated, in which the animal is fully enveloped. But the purpose of the open coccoon is only now to be discovered; it is, that the inclosed nymph may be exposed, without resistance, to the deadly jealousy of its rivals. Were it close, the sting of the queen, which seems never to be used excepting to destroy her own species, might be entangled in the silk, by which she herself might become the sacrifice, and occasion the loss of the whole hive.

Nature of drones.

Though only a single female can exist in a swarm, several hundreds, and sometimes thousands, of drones inhabit it. They originate towards the summer season, eleven months after the queen has commenced laying those eggs that become workers, that is, when the propagation of the colony takes place. The sole office of the drones, so far as has yet been discovered, is to fecundate the queen; for we can scarcely admit, as several authors have done, that their heat and custom of crowding on the combs is instrumental in hatching the young brood. Concerning the structure of the genital organs, which are extremely complicated, we shall refer to the works of Swammerdam, Reaumur, and Huber, who have expatiated on it at great length. Drones want a sting; and there is a difference in the conformation of several other parts of the body, as the trunk and antennæ, from those of females and workers. They do not collect honey, but consume it; and instead of entering the cells, as the females and workers do, for repose, they cluster together on the combs. If the sole office of drones be to fecundate the queen, we cannot well account for their numbers. Why should thousands dwell in a hive a burden on the community, when one is enough to perpetuate their race, and when only a single impregnation is required? Naturalists, who have ascribed the fecundation of the queen bee to a certain *aura* emanating from the males, judged it essential that they should be in numbers, that the *aura* might have sufficient power or intensity. Those observers, again, who have demonstrated, that impregnation is operated without the hive, deem it necessary that the drones should be numerous, otherwise the queen would have little chance of meeting any one in her course through the air: and others, even the most acute persons, who allowed themselves to believe, that here the solicitation was on the part of the female, thought that this redundancy of males was given, in order that she might make her choice. These reasons are to us alike unsatisfactory: the first, from its being utterly adverse to the laws which regulate the preservation of animals; the second, from resting on no surer basis than on simple conjecture, still unsanctioned by evidence; and the third, from being a conclusion on facts which never happen. Nevertheless it is unquestionable, that a hive, deprived of drones, will produce no young, though we cannot form an idea of
precise number necessary for the ends of generatic

After a particular period of the year, when
queen has been impregnated, and when the mascu
properties of the drones are no longer of any use, t
are mercilessly destroyed by those very workers wl
once watched so carefully over their origin. This
fact well known, and has given birth to various hy
theses. In Britain, as in other countries, the pe
of the massacre probably depends on the advancen
of the season, and always happens during the aut
months. The drones then flying from destruct
are seen on the flowers, occupying the panes of
windows, or wandering about from hive to h
which they no sooner enter than death awaits th
This incident occurs sooner on the continent, wl
the seasons are earlier, compared with ours; and
shall cite the substance of some observations l
Swiss naturalist, by which it is materially illustra
"It is usually in the months of July and August
the bees free themselves of the males. They a
that time drove away and pursued to the inmost p
of the hive, where they collect in numbers: an
many are then found dead on the ground, it was t
concluded that, after being expelled the hive, t
are stung to death by the bees. Yet, on the surf
of the comb, the sting is never observed to be
against them; the bees seem satisfied with purs
and chasing them away. To ascertain the tr
we thought of getting the support of the hive m
of glass, and of placing ourselves below, to disco
what passed in the scene of action. A glass
ble was therefore constructed, on which six hives c
taining swarms of the same year were put, and ly
under it, we endeavoured to see in what manner
drones were destroyed. Our contrivance succeed
to admiration: on the 4th of July, we saw the wo
ers actually massacre the males in the whole
swarms, at the same hour, and with the same pe
liarities. The glass table was covered with bees f
of animation, which flew on the drones as they c
from the bottom of the hives; seized them by the
tennæ, the wings, and the limbs; and, after hav
dragged them about, or, so to speak, after quarter
them, they killed the unfortunate victims by repe
ed stings, directed between the rings of the bel
The moment that the formidable weapon, with wh
the workers are armed, touched them, was the last
their existence; they stretched their wings and ex
red. At the same time, as if the workers did not c
sider them so completely dead as they appeared to
they struck the sting so deep that it could scarcely
withdrawn. Next day having resumed our position,
witnessed new scenes of carnage: during three ho
the bees furiously destroyed their males. On t
preceding evening they had massacred all their ow
but now they attacked those which, driven from t
neighbouring hives, had taken refuge amongst the
We saw them also tear some remaining nymphs fr
the combs: they greedily sucked the whole fl
from the abdomen, and then carried them away. T
following days no drones remained in the hives."

The cause of this cruel extirpation of so great
portion of the community, is very far from being e

dent. It is not enough to say, that it is from the drones being no longer of any use in propagating the species; or that their numbers would be a burden on the rest, seeing they are altogether inefficient. Conclusions deduced from either of these reasons, are not to be admitted in our present state of knowledge respecting the natural history of bees. Probably, however, our attention should be directed to the consequences of the drones having fulfilled the purposes of generation; for they are never destroyed in hives wanting queens, nor in hives where queens lay eggs producing males only. In both situations they are tolerated and fed, and may be seen living in perfect security throughout the winter. The massacre happens in those hives alone possessing queens completely fertile; but never until the season of swarming has elapsed.

In considering the nature of the individual species of bees inhabiting a hive, an acquaintance with which, we repeat, is indispensable before converting their labours to use, we have to notice some of the peculiarities exhibited by workers. It is to this great class that the welfare of a hive properly belongs: without their incessant aid, the males, females, and even the brood itself would quickly perish; and if the presence of a queen be essential to their safety, they are no less requisite for her preservation.

Certain facts, we have already remarked, tend to establish, that all workers are originally females; and in most, perhaps in every hive, some are found laying eggs, which will be future drones. But here viewing them as a large class of the community, consisting of twenty, thirty, nay forty thousand individuals, we behold them employed in various purposes extremely diversified for the general good. They are charged with cleaning and preparing the cells appropriated for the embryos of their own kind, of the queens, and the males: they collect the honey, obtain wax, and build the combs: likewise, they gather a particular substance, (resinous, as is supposed,) with which all the crevices of the hive are closed, and its inside covered. After the queen has deposited her eggs, the workers supply the food adapted for the worms of each species, and regulate the proportions, so as to serve until the last metamorphosis is undergone: and they seal every cell with a covering different, according to the different worm included, at the proper and appointed time. Nor are these the limits of their occupations; while some guard the queen, construct the combs, and watch over the necessities of the young, others keep constant watch, day and night, at the entrance of the hive: if a stranger bee, a wasp, or noxious insect appears, it is instantly repelled or destroyed: even should a queen, which, on usual occasions, is treated with such unequivocal marks of regard, be introduced to the hive of any swarm but her own, the workers immediately seize and restrain her, and, without being wounded with their stings, the confinement she suffers is such, that she sometimes dies of absolute suffocation.

All the operative parts of the œconomy of the hive are entrusted to the workers; and as the collection of honey and combs which they construct are the substances converted to our use, and indeed is the main purpose of our cultivating them in numbers, it is proper that we should elucidate the manner in which this is effected. Honey is a vegetable secretion, which appears at different seasons of the year, especially when flowers in general blow. We can readily understand how it is stored up by the bees: they lick it with the proboscis from the flowers; it is swallowed; and on their return to the hive, it is disgorged, not from the trunk, but the mouth, into the cells. Only a small portion is collected by each, but the united labours of thousands produce an abundant harvest. Reaumur has calculated, that within an hour 3000 bees have returned from their collections to a hive, whose population did not exceed 18,000; and in six days, Swammerdam, if we rightly understand his expressions, found nearly 4000 cells constructed by a new swarm, consisting of less than 6000 bees. Some of the cells filled with honey are destined for the daily consumption of the bees, and others are sealed up and reserved for times of necessity. Many of the labourers free themselves of their collections before reaching the cells, by bestowing them on their neighbours; the trunks of the latter are seen extended, and they receive the honey with them as it is disgorged.

It is sometimes poisonous.

Honey being a vegetable product, its properties depend entirely on the nature of the plants from which it is collected: one kind is of the finest flavour, delicious to the taste, pure and transparent; another is entirely of a different consistence, dark, greenish, tenacious or bitter; and a third kind has been known to produce deleterious effects, which were almost, if not completely, fatal to human life. Dioscorides, Pliny, and various ancient authors, speak of honey in the East being dangerous in certain years; and Xenophon relates, that when the army of ten thousand approached Trebisond, the soldiers having partaken copiously of honey found in the neighbourhood, were affected like persons inebriated; several, on whom it had more violent consequences, became furious, and seemed as if in the agonies of death. Though none of them died, all were extremely weak for three days. In recent times, we are told of the pernicious effects of a particular kind of honey collected in America; and plants grow in the Archipelago, the honey of which is said to occasion vomiting. Thus Don Felix Azara informs us, that there is a particular kind of honey collected in Paraguay, called *cabatatu*, which occasions a severe headach, and produces as perfect intoxication as ensues from brandy; while another kind brings on convulsions, attended with the most excruciating pains, which last thirty hours.

Wax is produced from honey.

Bees are seen laden with a yellowish substance in very considerable quantities, which also is stored up in the hive. This is not wax, as is commonly supposed, but either the pollen of flowers, which is used for feeding their young, or propolis for stopping the crevices of their dwelling. The combs are constructed of wax, which owes its origin to honey: or it may be formed from sugar, the saccharine part of which constitutes one principal ingredient of honey. Naturalists have adopted many conjectures concerning the mode in which it is elaborated by the bees. In general they supposed that the yellowish pellets adhering to their limbs were swallowed, and afterwards disgorged as wax in a state of purity. The process is still obscure, but recent experiments seem to afford reason for believing that it may transude between the scales of the abdomen; and the appearance presented by wax on such places led former observers to affirm, that it was collected there instead of on the limbs. It is established by satisfactory experiments, that, whatever be its issue from the body of the bee, it originates from honey. Mutual relations subsist in their elementary principles, and the one is dependent on the other. Those years unproductive of honey are also unproductive of wax; and we often see swarms which begin their collections with the most promising appearance, still make but little progress, and terminate with acquiring too small a quantity of honey for their future subsistence. In these cases, wax is sparingly provided also. What led to a narrow investigation of the preparation of honey from wax, was a naturalist observing that bees continued carrying quantities of the yellow pellets or pollen into hives quite full of comb, and where there was no room to construct more; and on the other hand, that they enlarged the combs of hives containing only a small portion, and did so without carrying in the pellets at all. Succeeding experiments proved that the pollen which they collect from the antheræ of flowers, is used solely for feeding their young, being the same which, in ordinary description, we call farina, or bee bread; and that they will take it grain by grain in their teeth, to transmit it into the mouths of the larvæ: a remarkable trait of patient industry. In ascertaining the mode by which wax was produced from honey, M. Huber confined a swarm of bees in a straw hive to an apartment, along with a quantity of honey and water necessary for their subsistence. The honey was exhausted in five days, and five combs of the finest snow-white wax were then found suspended from the arch of the hive. Lest this might have been the produce of the farina carried in by the bees when their confinement commenced, all the combs were removed, and the imprisonment of the bees repeated. But the result was the same; they formed other five combs of the finest and whitest wax. It is the saccharine part of the honey which produces wax; and bees supplied with equal portions of honey, and of sugar reduced to a syrup, produce a greater quantity of wax from the latter. From a pound of refined sugar reduced to a syrup, and clarified with eggs, a swarm of bees produced ten drams and fifty-two grains of wax, darker in colour than what they extract from honey: From a pound of dark brown sugar, they prepared twenty-two drams of very white wax, and the like from the same weight of sugar of the maple. Wax is produced sooner, as well as in greater proportion, from sugar than from honey; and the darker the sugar, the finer is the wax. Repeated observations prove, that the secretion of honey in flowers is powerfully promoted by the electricity of the atmosphere; and bees never labour more actively than during humid sultry weather, and when a storm is approaching. Sometimes the secretion of honey is entirely suspended by the state of the weather, which occasions a total interruption of the labours of the bees; and if this be too long protracted, a populous hive may actually die in the midst of summer. The odour exhaled by the hives, and the size of the bees, are always certain indications whether the flowers contain honey. When numbers of bees return from their excursions with the belly thick and cylindrical, it shews they are gorged with honey; and these are exclusively the workers in wax. The belly of those performing the other functions, always preserves its ovoidal form, and does not sensibly increase in size. Although the flowers be destitute of honey, bees still are able to store up quantities of farina or pollen necessary for feeding their young. Part of it is immediately given to them, and, as is affirmed, what is superfluous is reserved in cells. Sixty-five hives, the whole of which exhibited workers in wax, were examined on the 18th of June, when the country was covered with flowers, and while the bees actively pursued their collections. Those returning to old hives, having no cells to construct, deposited their honey in the combs, or gave to their companions; but those of new swarms converted their honey into wax, and hastened to build combs for the reception of their young. Chill and showery weather interrupted their labours, and the combs received no addition by the construction of new cells. The weather however altered, the chesnut and elm were in flourish, and the thermometer on the first of July rose to 77°: the bees resumed their labours with the utmost activity from that day until the 16th, both in honey and wax. But thenceforward no honey being produced, they collected quantities of pollen only; and the odour of the flowers shewed there was nothing excepting an inconsiderable secretion of honey at intervals, barely sufficient for subsisting the bees. It was found, on examining the sixty-five hives in the end of August, that, after the middle of July, the bees had ceased to work in wax; that they had stored up a great quantity of pollen; that the honey of the old hives was very much diminished, and in the new ones scarce any remained; as what was at first collected had been consumed in the preparation of wax. Thus it appears, that, in the natural state, honey is the source of wax, and the food of bees; that its secretion from flowers is affected by adventitious circumstances; and that its qualities are different in different countries. No elementary principles of wax reside in pollen; this substance is collected solely to feed the young contained in hives, and the perfect bees themselves never live upon it.

The propolis is another substance collected fro plants, which is extremely useful to bees. Besid the purposes of stopping crevices, covering the in rior surface of the hive, the sticks supporting th combs, and gluing the hive to the board on which stands, bees employ it in greater portions at onc Stranger animals of small size entering a hive are i mediately stung to death, and then dragged by t bees to the outside: there are few persons who ha not seen that a dead fly, or bee laid on their board, quickly carried away and dropped at a distance: seems the nature of these insects not to endure a filth or corruption in their habitation. Should larger animal, such as a snail, make its way into th hive, it does not escape; it is put to death, but th bees are unable to divest themselves of its bod Maraldi relates, that he saw the dead body of a totally covered with propolis, and thus prevent from spreading infection in the hive; and Reaumur tells us, that a shell snail having fixed itself on the pane of a glass hive, waiting until the moistness of weather should be an inducement for it to move, the bees encircled the mouth of the shell with so thick a bed of propolis, that the animal, unable to moisten it as it moistens its own gluten, was arrested on the spot. The original source of the propolis is not yet perfectly understood: it is much more tenacious, and attains a greater degree of hardness than wax: those bees that return laden with it, owing to its tenacity, experience considerable difficulty, even with the aid of their companions, in divesting themselves of the load. M. Ducarne observes, "several times I have seen bees occupied in collecting, or rather in tearing away with their teeth, the propolis of old hives which I had exposed to the sun; and this appeared so laborious, and the animals pulled so forcibly, that I thought their heads would have been separated from their bodies."

The structure of the cells, which are exclusively the production of the workers, has excited admiration in every contemplative mind; and it is demonstrable, that their figure is the best adapted for containing the greatest possible quantity in the least possible space. A number of cells united constitute the comb, between twelve and thirteen inches square of which, Reaumur calculated, would contain 9000. The primary object of the cells seems to be for propagating the young; after these have gained maturity, they are cleaned out and filled with honey; but there are cells also destined for this purpose from the beginning. The same cells may be employed for several successive broods, and when the whole have come to perfection, they are appropriated for the winter stores: those at the top of a comb are neatest and best made, as well as of better materials, compared with those at the bottom. In the shape and size of the comb, bees are guided by circumstances; a small cavity is totally filled with equal combs, while in one of greater dimensions there may be some large, and others not one-fourth of the size. By a law of nature, from which they seldom deviate, the foundation of the second comb is laid parallel to that of the first, and the successive combs are generally parallel to each other. Sometimes they are seen at right angles, or apparently misplaced, which probably results from ccidents having an influence on the earlier part of heir construction. There is usually the distance of our lines between each; and should the comb, in its onstruction, have taken an oblique direction, it is fterwards brought into a more perpendicular line y the bees, which diminishes the vacancy interening. Combs originate in the top or arch of a ive, and are worked downwards; but should the pper part be removed, it is said the bees will work pwards to fill the cavity. In order to shorten the ourses which they would necessarily have to make ound the surface of large combs, they open various ommunications through them, and also open passages between their edges and the side of the hive; t least we are not acquainted with any other purposes of such perforations found in them. The cells composing a comb are of three kinds, corresponding to the three species of bees; but there are considerable irregularities in the structure of all: neither do those of the workers invariably exhibit that perfect hexagonal figure which many persons expect to find. It may appear singular how bees can fill horizontal cells quite full of honey, and yet prevent it from escaping. Perhaps it is partly retained by its own viscosity, and from adhesion to the sides of a tube of such small diameter. Each cell is sealed with a flat covering most ingeniously devised: it is Nature, however, that must have done so. A circle is formed around the mouth of the cell, which is gradually diminished by other concentric circles, until the aperture remains a point capable of being closed by a single grain of wax.

Swarming.

Though the hive be amply stored with honey and wax, and the young brood gradually approaching to maturity seems to leave nothing to be desired by the bees, they all of a sudden desert their habitation to go in quest of another. For this incident, which is called *swarming*, there is no ostensible cause, nor do the reasons assigned for it by different observers prove satisfactory in our estimation; for its occurrence is irregular, and its frequency is uncertain. According to common apprehension, swarming ensues from a hive being overstocked with bees, and especially from a young queen seeking a new dwelling. It never takes place, we acknowledge, unless the bees be numerous; but there are so many exceptions, that we cannot say it is from wanting room: and instead of the young queen, it is always the old one that leads out the swarm: nay, should an old queen have conducted a swarm of this year, she will also be found at the head of the first which next year leaves the hive. Each subsequent colony departing is led by a young queen. An old queen never leaves her hive until she has deposited eggs which will become future queens, nor until her principal laying of the eggs producing drones is over; the common bees construct royal cells only, while she lays those eggs which will be transformed to drones; and after this laying terminates, her belly being more slender, she is better able to fly; whereas it is previously so heavy and surcharged with eggs, that she can hardly drag herself along. One chief cause or concomitant of swarming apparently consists in the agitation of the queen. She is suddenly affected, hastily traverses the combs, abandoning that slow and steady progression which she ordinarily exhibits: her agitation is communicated to the bees; they crowd to the outlets of the hive, and the queen escaping first, they hasten to follow her. Commonly the whole take but a short flight, and the queen having alighted, the bees cluster around her. This constitutes the new swarm. With regard to the precursors of swarming, there is no infallible guide: those on which observers are accustomed to rely, the most frequently prove fallacious. The general indications given by Reaumur, a naturalist of the first eminence, who draws his conclusions from facts, and has fallen into few errors, are, first, the appearance of drones in a hive; for no swarm will proceed from one where there are none: secondly, when the bees are so numerous, that part crowd about the outside of the hive, or lodge on the board in clusters of thousands: and thirdly, which is the least equivocal sign of the day of swarming, when fewer bees than usual go abroad for collection, and return without honey or wax. Most observers also affirm, that in the evening before swarming an uncommon humming or buzzing is heard in the hive, and a distinct sound from the queen, called *tolling* or *calling*. Mr Hunter compares it to a note of a piano forte; and other authors to different tones. This we rather incline to suppose is not an indication of swarming, but a proof that there is a young queen as yet confined in her cell, and that probably the sound proceeds from her. We shall afterwards have occasion to say a few words concerning the power of a queen in emitting sounds, and the wonderful effect which these instantly produce on the whole workers.

The old queen leads out the swarm.

In illustrating the concomitants of swarming, we shall again resort to the observations of the naturalist Huber, one of the few investigators of the subject, whose remarks are to be received with implicit credit. After establishing that an old queen conducts swarms, leaving worms or nymphs in the hive, which, in their turn, transform to queens, he availed himself of a favourable season to follow their history in the perfect state.

A young queen being introduced into a hive on the 12th of May, the bees received her well, and she immediately began laying. Twelve royal cells, all situated on the edges of the communications or passages through the combs, were begun on the twentieth, and on the twenty-seventh, ten of them were much, but unequally, enlarged. On the twenty-eighth, previous to which the queen had not ceased laying, her belly was very slender, and she began to exhibit signs of agitation. Her motion soon became more lively, though she still continued examining the cells, as if about to lay: sometimes introducing her belly, but suddenly withdrawing it without having laid; at other times depositing an egg in a different position from what it should naturally have. The queen produced no audible sound in her course, nor was any thing heard different from the ordinary humming of bees. She passed over the workers in her way: at times on stopping, those meeting her also stopped, and seeming to consider her, advanced briskly, struck her with their antennæ, and mounted on her back; and she proceeded thus carrying some of them above her. The bees no longer inclosed and formed regular circles around the queen, nor did they supply her with honey; but she voluntarily took it from the cells in her way. Those which were first aroused by her motions, followed her, running in the same manner, and in their passage excited others still tranquil on the combs. The path she had traversed was evident after she had left it, by the agitation there created, which never afterwards subsided. The queen had now visited every part of the hive, and occasioned a general agitation: if some places yet remained quiet, the bees in motion arrived, and imparted that which affected them. The queen discontinued depositing her eggs in the cells: she dropped them at random; and the workers ceased to watch over the young. They ran about in every different direction: even those returning from the fields before the agitation reached its height, no sooner entered the hive, than they participated in the same tumultuous impulse: they neglected to free themselves of the waxen pellets on their limbs, and ran heedlessly about. At last the whole rushed precipitately to the outlets of the hive, and the queen along with them.

These facts were ascertained with the utmost care, and corroborated by future experiments. On the first of June, all was quiet in a hive at eleven in the forenoon; but at mid-day the queen, from a state of perfect tranquillity, became evidently agitated, and her agitation was insensibly communicated to the workers in every part of their dwelling. In a few minutes they precipitately crowded to the outlets, and, along with the queen, left the hive. After they had settled on the branch of a neighbouring tree, the observer sought for the queen, thinking, if she was removed, that the bees would return to the hive: a fact which actually ensued. Their first care then seemed to consist in seeking their female: they were still in great agitation, which gradually subsided, and in three hours complete tranquillity was restored.

Our limits preclude us from entering at sufficient length on this most interesting part of the natural economy of bees, and we must be content with referring to the works of the two celebrated authors already cited. The latter ascribes the chief inducement of those bees conducted by young queens to swarm, to the agitation by which the queen is animated being imparted to them. He endeavours to trace the source of that agitation to the antipathy mutually entertained by the females, which, extending even to those in an imperfect state, is directed against the nymphs lodged in the cells. No sooner does a young queen herself attain maturity, than she attempts to destroy her rivals: but there is a constant guard of workers preserved over them; she is repulsed, maltreated, and driven away. If deserting one cell she approaches another, it is to experience the same resistance; she is actuated by an unconquerable desire to accomplish her object; she is harassed by the incessant opposition of the bees; agitation then ensues, and she resolves on flight. It is here to be observed, that although experiments prove that the agitation of a queen is communicated to the workers, and though, with regard to young queens, such may influence the bees to swarm, the same reasons will not apply to old queens leading forth new colonies, for what we have above described only belongs to young ones. So long as a young queen remains in a virgin state, she meets with little of that conspicuous respect, care, and attention, which is lavished on her when the bees know she is about to become a mother. She is previously treated with great indifference; and hence arises the resistance she suffers when attempting to destroy the nymphs in their cells, and her consequent agitation. "But the conduct of the bees towards the old queen destined to conduct the first swarm, is very different. Always accustomed to respect their fertile queens, they do not forget what they owe to her: they allow her the most uncontrouled liberty. She is permitted to approach the royal cells; and if she even attempts to destroy them, no opposition is offered by the bees. Thus her inclinations are not obstructed; and we cannot ascribe her flight, as that of the young

the resistance she experiences." These
greatly increase the difficulty of attempt-
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ich increases their animal heat, and raises
ture of the hive to such an insupportable
they hasten to leave it. In a populous
the thermometer stood from 92° to 97° in
er day, it rose above 104° during the
h preceded swarming.
ordinary instinct and precautions so con-
bees, are apparently affected during the
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ho seem more actuated by the love of the
han an exposure of truth, that they are
th that prescience which induces them,
departure, to prepare a place for their
On issuing from the hive, bees, so nearly
determine, have no object in view ; and
esort to situations the most unlikely, and
nsuitable for their convenience or preser-
ter rising in the air, it is commonly some
rests their progress, and the queen fre-
hts at the unsheltered extremity of a
re the bees that may have formed into va-
s in the vicinity, come to surround her.
e known them repeatedly swarm on the
he hive they had forsaken, notwithstand-
re at no great distance.
rm only during the best weather, and in
rt of the day. Sometimes all the pre-
swarming, disorder and agitation, have
but a cloud passed before the sun, and
was restored.
swarms oftener than once, the new swarms
ose bees that have been abroad when the
took place, added to young ones come
gs, laid by the queen before her depar-
is led out by a young queen, as there
everal royal cells in a hive : but the bees
the whole queens nearly of an equal age
g their cells, though come to maturity ;
y do liberate them, it is according to their
hey have some secret means of ascertain-
oldest are invariably liberated first.
ng swarm, whether removed from the
it settles or not, begins to work ; cells
ted of wax from the honey the bees have
with them ; and nature has so arranged
irst eggs laid by the queen produce the
rt of the community.

I. TREATMENT OF BEES.—We have thus
atural history of the honey bee from its
ttaining perfection, and shown how the
es form one great colony, where labours
n for the common good. We have ex-
, that, at a certain season, bees desert
ion in quest of another, which, in a do-
ate, the cultivator is careful to provide ;
and we shall now proceed to the practical treatment of bees, and point out how their labours are to be converted to utility, profit, and pleasure.

Different kinds of hives.

All the circumstances above related having taken place, the new swarm is lodged in a hive, there to commence the collection of honey, the fabrication of wax, and the perpetuation of the species. Much has been said of the fittest size and figure of a hive, and of the substance of which it should consist : wood, straw, and oziers, have all been recommended ; and round, square, oblong, and hexagonal hives have had their particular partisans. These things, we apprehend, do not merit the importance bestowed upon them ; and our reason for saying so is, from having seen the most ample products of honey, under conditions almost diametrically opposite. At one time we have seen large straw hives, of the ordinary fashion in this country, full to the brim of rich honey comb ; at other times we have seen them almost empty, without any sensible cause, and where circumstances seemed to favour the reverse. We are thence induced to conclude, that less depends on the shape and capacity of the hive, than on the kind and quantity of the swarm introduced into it, and on the season in which their collections are made. Examples have come under our notice, where a swarm, lodging in the roof of a house, has produced a great quantity of honey in combs only four or five inches broad : another swarm also in the roof of a house we have known to fill combs above eighteen inches in breadth. Exposure to the north or south has not affected the bees : their provision has been equally abundant. And here we may remark, that in all instances that have fallen within the sphere of our observation, the products of swarms, lodged in the roofs of houses, have invariably been abundant. We do not pretend to account for this. Perhaps it may partly result from their labours being performed without any disturbance or interruption ; partly from the greater heat preserved in a roof during summer. Heat is the soul of insects : their action and exertion are directly in proportion to the temperature of the atmosphere ; and cold is the bane of their existence. It is not unlikely, also, that the same cause promoting the hatching of the brood, contributes to render the colony more numerous ; and if their swarming is at all dependant on want of room, large portions of them have not an equal inducement to seek another dwelling. Pallas tells us, that the Russian peasants, in remote parts of the empire, hollow out a part of the trunks of trees, 25 or 30 feet from the surface of the earth, for the purpose of hives ; and cover the opening with planks, having small apertures for the bees. At Cazan, Mr Bell saw hives of a similar form, which the inhabitants bound to the trees at the side of a wood, in order to secure them from the bears.

As abundant collections of honey are often made in the common straw hives, we cannot affirm that they are unsuitable for the purpose ; but they are attended with the disadvantage of preventing the owner from an early appropriation of the labours of the bees. One convenience, indeed, lies in the facility of construction, which always merits due appreciation in every branch of rural economy ; and, also, that the cost is inconsiderable. Though neither the size nor figure of the hive be important, all modern cultivators seem agreed that it should be susceptible of additions. In the ordinary straw hive, the addition is made by raising it on a circular ring or hoop, either of wood or of the same materials; a clumsy and aukward expedient, which commonly leads the bees to waste much of their labour in filling up crevices. Notwithstanding this, it is adopted in Brittany with some little difference, and there called the *Scotch hive*. The hive itself consists of two pieces, each twelve inches wide, and eleven high, made of rolls of straw. The under one is divided from the other; but a communication hole, fifteen or eighteen lines in diameter, is left for the bees. As they work downwards, the under part, which is nothing but one of our common *ecks*, or broad hoops, is next filled.—Pyramidal hives have been made several feet in height, and divided into different stages, or compartments; which the bees, after being lodged in the highest, would successively fill on removal of the floors or stages.—Boxes of convenient size and form, placed above each other, have likewise been recommended, and which we should suppose well adapted for enabling the cultivator, at all times, to take the honey with ease. Such boxes are made of well seasoned wood, nine inches long, the same in breadth, and eight inches high; but from what we have said, there is no necessity for a rigid adherence to these dimensions. In the roof there is a communication hole three inches square, on which is placed another box of similar structure; others may be raised above this to an indefinite height; and the bottom of each is open like the mouth of a common hive. When a swarm is lodged in a box, if only two be used, it is immediately to be put over an empty one, as the bees must have more room; and if more than two are used, a new one is successively to be supplied below. The bees, beginning from above, will soon fill the upper box with honey; and it is then to be separated from that beneath it, by drawing through a long thin pliable knife to cut the comb. The communication hole of the lower box must then be covered with a board, and the box separated carried to a distance, where the bees remaining in it may be dislodged, by turning it up and rapping on its sides with a small stick. The proper time to perform this operation is at sunrise.—Collateral boxes have also been suggested, from the belief of their being attended with greater advantages to the bees. The size is nearly the same with that above mentioned. There is a communication hole in the side, and an opening low and wide below in the sides applied to each other, to allow the bees more ready passage. Collateral hoops of twisted straw or wood were long ago invented, by which means the inventor enlarged his hives to an unlimited extent; and these he kept, with great advantage, in a garret near the roof of his house.—Madame Vicat invented a kind of hive, composed of hollow frames of three sides, which are connected together, and can be separately taken out at pleasure. Each frame is made of three pieces of plank, half an inch thick. The two side pieces are eleven inches high, and five and a half broad; the piece connecting them above is seven inches long, and they are ten inches asunder at the bottom. The sides of these open frames are applied to each other, and if one of four be taken away, an empty one can be introduced, or the remaining ones can be closed together.—Somewhat analogous to this is the *leaf* or *book hive*, invented by M. Huber, some of which construction have recently been adopted in Scotland, after the description he gives of it. This consists of twelve hollow frames, twelve inches high, nine or ten in breadth, and fifteen lines in width, as it is intended each shall receive only a single comb. These twelve frames, laterally applied to each other, form the whole hive. All are connected by means of hinges at the back, so that they divide asunder in opening like turning over the leaves of a book. The ten intermediate frames, between the first and twelfth, are hollow; the outside of these two are covered; in them, also, is an entrance for the bees; there should be one in all the rest, to open at pleasure. On first lodging a swarm in one of these hives, a small piece of comb should be fixed in a division, to guide the direction of those built by the bees, which will be parallel to it; and as each frame contains but a single comb, it is extremely well adapted for observation, and it also admits the removal of that comb without affecting or deranging the rest. The whole contents are exposed to view, the queen is easily found, and whatever should be removed or altered can be selected with great convenience. The inventor conceives that the book hive has the property of rendering the bees more tractable; for on opening any of the divisions, the bees rather testify fear than anger, by returing into the cells as if to conceal themselves. This he ascribes to the effect which the sudden introduction of light has on them; for they are less tractable after sun-set and during night than through the day. The divisions must be separated slowly, and care observed to avoid wounding the bees. If they cluster too much on the combs, they must be brushed off with a feather, and breathing on them cautiously guarded against. The air which we expire seems to excite their fury; and it certainly possesses some irritating quality, for if bellows be used the bees are more disposed to escape than to sting. Another advantage attends the leaf hive, which consists in the power of the operator to make the bees work in wax, or, which is the same thing, to construct new combs. All that is here required is to separate those already built so far asunder as to leave an interval in which additional ones may be constructed. Suppose that a swarm be lodged in a leaf hive consisting of six divisions, each containing a comb. If the young queen be as fertile as she ought, the bees will be very active in their labours, and disposed to make great collections in wax. To induce them towards it, an empty frame, or division, should be placed between two others, each containing a comb. From the necessity which nature has imposed on these insects of never leaving more than four lines between their combs, they will soon begin to build a new one in the empty space, which will be parallel to the others. The number of vacancies left may be proportioned to the strength of the swarm, and the goodness of the season; but they should not be forced too much to work in wax.—M. Feburier, the most recent observer on this subject, and who, we believe, is just about to publish a work regarding it in Paris, has recommended a hive to the National In-

a quadrangular pyramidal figure, with move-
. Its principles are said to be founded on
I. Schirach and Huber; but, as yet, they
fficiently detailed to enable us to explain
wood be used, it must be extremely well
and perhaps covered with some thin var-
e outside, else it is apt to decay. Sir Tor-
man ascribes the scarcity of bees in Sweden
y to employing wooden hives.
who are anxious to view the various and
e operations of bees, may gratify them-
procuring hives with glass sides. This
y be denominated a modern invention, as
rds, that a Roman senator had something
me kind, made of the thinnest and most
t horn. But those entirely made of glass
known on the continent before the year
ugh they were made with panes in Eng-
r in the same century; and hives made com-
glass are spoken of in 1655. Glass hives
to be round, like the common shape, as
re concealed among the combs; they should
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ned in a single hive. It appears, that bees
raged by the smallness of their own num-
t, when greatly reduced, their instinct is af-
y labour with less activity, they cease to keep
the entrance of their hive, and testify more
e for their own fate and that of their young.
the advantage lies in a numerous swarm ma-
ter collections in a shorter time; in augment-
mperature of the hive; or in the different in-
ctions having larger classes of workers to
hem, we shall not attempt to decide. We
recommend the junction of two or more
to one, particularly when the period of col-
ws towards a close, and the sacrifice of their
rary queens. By this expedient it will be
while each could hardly subsist itself, and
rovision for winter, they will be enabled
during its most rigorous cold; and, if
tion be performed earlier in summer, they
r ample stores. Practical directions have
for the exact weight which a good swarm
should amount to. Bonner says, a swarm is very good if it weigh four pounds; and Butler maintains, that "the goodness or greatness of a swarm you may most certainly know by the weight: it being a good one that weigheth five pounds; a reasonable good one that weigheth four; and a very good one that weigheth six." But the number of bees in a pound is very far from being ascertained, which must restrain us from pronouncing on the exact weight that should constitute a good swarm. Thorley, whose work on bees participates of many of those absurdities in which most authors on this subject have allowed themselves to indulge, observes, "In October 1743, when putting the bees of a small late swarm into an empty hive, and afterwards upon a table, I took a particular account of their measure, weight, and number: in measure a quart; in weight one pound and a quarter; in number two thousand." And he concludes, that the number of bees in a swarm weighing four or five pounds would be 8000, or upwards; whence a suitable hive for 8000 or 10,000 bees should be equivalent to two pecks and a half, or three pecks, in capacity. The calculations of M. de Reaumur produce a very different result. A very fine swarm which left one of his hives he estimated to consist of 43,000 bees, and weighed eight pounds. Thus there are, according to him, 5376 in a pound of 16 ounces; and Butler, who, in spite of all the extravagancies of his work, certainly made some accurate observations, estimates the number of bees in a pound at 4450. We suspect, that both he and Reaumur have overrated the number.

Site of the apiary.

The situation and arrangement of the apiary claim the cultivator's attention. Each hive should stand on a wooden sole, or rest, supported on a single wooden post driven into the ground, or on three close together, near the centre of the board, that the enemies of the colony may have difficulty in crawling up from below. It should be fixed securely, so as to escape being overturned by the wind; but the common custom of laying a turf on the top must be avoided, on account of the harbour it affords to noxious insects. Hives should stand far apart; if there are six hives in one portion or division of the apiary, they should not be less than nine or twelve feet asunder. But too great a number never should be situated in the same district. The collections of bees are drawn solely from flowers, and perhaps, in some small measure, from honey dew, which at times appears on leaves, and is said to produce an inferior honey; it is therefore evident, that immense quantities of bees, actively employed, would not be long of exhausting the whole. The number of hives should, therefore, be regulated by the situation of the apiary. A district abounding with flowers and blossoms will admit of more than one where the chief product is grain. An apiary ought to stand in a quiet sheltered place, where the bees may perform their labours totally undisturbed: flowers, particularly those most fruitful in honey, should be copiously disseminated around; and, for the facility of saving swarms, it is better to have low flowering shrubs in the vicinity than lofty trees. Means should be practised to obtain a succession of flowers in successive seasons, that the bees may always have the

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ecies, particularly swallows, spar-
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ed noxious, can do little harm; for
are very few, if any, of the former
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latter is soiling the hive. More dan-
væ of a small moth, hatching from
thin the hive, as they are destruc-
and likewise the *sphynx atropos* in
but most formidable of all are wasps
plunderers of their own species.
ng strong and vivacious animals, are
ving bees, and suck the honey from
r they may penetrate the hive, and
mb. When a wasp tries to enter, it is
ving made good its way, we believe it
garded, and may leisurely satiate itself
The nests of wasps ought to be care-
t and destroyed; if in the earth, by
g water down their hole, or kindling a
raw where they are less accessible. Ob-
dently affirm, that a whole swarm of
fect of food and other causes, sometimes
eir natural collection, and becoming a
nderers, rob the stores of their neighbours.
which will appear from the contests per-
king place on the boards and about the en-
other hives, it is necessary to ascertain
e depredators come, whether from neigh-
ves or from those at a distance. If their
r seems to arise from want of food, as those
ovisioned are more apt to follow this me-
supplying themselves, they must be fed at
hen the sun is down, and while all the bees
rned. It is reported not to be an uncommon
for a swarm to abandon their own hive, and
ssession of another to relieve their necessities.
n losing the queen, having no interest to pro-
their labours, if brood be wanting in their
sometimes begin to pillage the hives in the
urhood. The obvious remedy is here to pro-
m with a queen, whereby all their faculties
roused, they will be reclaimed to their usual
Schirach warns us, on removing comb from
to beware of scattering or dropping it, and
ce the hive exactly in the same position as
otherwise the inhabitants of stronger colonies will obtain more ready access to attack the honey in the combs, or to collect what has fallen from them. The weakness of a hive is one great inducement for its neighbours to pillage; and as cleanliness, and being kept free of vermin, preserve the vigour and activity of its inmates, due attention to them should not be neglected. Removing the hive, which is the object of plunder, and covering it with branches, has been recommended; and such an expedient will certainly present a good chance of escape.

Precautions adopted by bees when in danger.

But all the devices adopted by us are poor and insignificant, when compared with those resorted to by the bees themselves to provide against danger. Here we have an opportunity of admiring that wonderful instinct, which animals, standing so low in the scale of creation, exhibit. Even supposing them to possess nothing analagous to reason; that the regard for their queen, and the watchful care of their young, result from some pleasurable sensation; that the massacre of the drones originates from some sudden principle of aversion,—we cannot refer their precautions to avoid danger to any relative source. It is evident that they labour in concert; that their operations tend to one general object; and that they are aware of it being fulfilled. Surely all this cannot be done without some mode of communication with each other: but considering that every thing they perform is in the dark; nay, that the perfection of their work is partly proportioned to the privation of light, the difficulty of conceiving how they can know each others proceedings is greatly increased. It has been warmly contested, whether bees are capable of imparting what we should call thought in beings higher in the chain of animated existence, and especially, whether there be any thing resembling voice among them? We have already remarked, that the workers can retain young queens in their cells after attaining complete maturity, which they are capable of doing by strengthening the seal or covering with additional wax: and that they regularly liberate the oldest of those of different ages. A sound, which we cannot compare to the buzzing of insects, by the balancers beating on their wings, is heard from the young queens. No researches, however, have yet detected the organ, if it is an external one, from which the sound proceeds. When a queen is hatched, she seeks the cells of those that will become her rivals, and uses every possible exertion to destroy them; but the workers, to which other queens, even in their imperfect state, are precious, generally present the most decided opposition, and render her attempts abortive. Yet, from the property which the queen possesses of emitting that certain sound before heard from her cell, their resistance becomes vain; it paralyses all their faculties; and she proceeds to operate destruction. The following observations, by a distinguished naturalist, on this head, lead to an illustration of the peculiarities among bees when exposed to danger, though they more immediately relate to another branch of our subject. "The first of a number of cells containing females, opened on the ninth of June, and a young queen, lively, slender, and of a brown colour, escaped from it. Now we understood why bees retain the females captive in their cells so long after the period of transformation has elapsed; it is [illegible] they may be able to fly the instant of being [illegible]. The new queen occupied all our attention. W[illegible] other cells, the bees on [illegible] chased her away: they [illegible] against her, and she en[illegible] considerable distance [illegible] was frequently re[illegible] twice emitted the [illegible] that had been heard [illegible] monotonous notes, [illegible] stood with her [illegible] on her [illegible] being un[illegible] of [illegible] affected by [illegible] motion[illegible] next day. [illegible] assiduously [illegible] queen ap[illegible] wounded [illegible] drove her [illegible] she [illegible] de[illegible] left [illegible] were now [illegible]

recollect, [illegible] perhaps [illegible] something like [illegible] sound emitted [illegible] the peculiar [illegible] which [illegible] improbable that [illegible] entry of the [illegible] which, though [illegible] the singular effect [illegible] of repulsion. [illegible] the conclusion, [illegible] tion of cultivators [illegible] sound can be artificially produced, and [illegible] will have influence on the bees. They are [illegible] aware of the presence of [illegible] and the danger resulting from [illegible] the copious collections of honey which had [illegible] made during summer, had entirely disappeared, the moths were uncommonly abundant. The [illegible] of a number of hives resolving to protect them [illegible] further pillage, closed their entrances with [illegible]tings, where the apertures were proportioned [illegible] size of the bees, on the 17th of September: [illegible] having enough for the whole, two were left [illegible]red. It was seen next morning on examination, [illegible] during the night, the bees had themselves take[illegible] necessary precautions, by contracting the en[illegible] of their hives, so as to make them quite safe [illegible] invasion. Each was completely blockaded by [illegible] composed of old wax and farina, in which the[illegible] had taken care to leave apertures corresponding [illegible] own size: two, that would prevent above t[illegible] passing at a time, were fashioned like inverted [illegible] a third was broad enough in front to admit [illegible] passage of several bees at once, but so low, that [illegible] were obliged to lean over on one side to get [illegible]. All the other hives proved, on inspection, to be [illegible]structed in the same way, even where provided [illegible] the tin gratings. In other instances, the b[illegible] constructed a double wall at the entrance of the [illegible] with covered galleries, so narrow, that no more [illegible] a single bee could pass: fifty-three swarms [illegible] these operations in the course of the same [illegible]. Bees, when attacked by plunderers of their own [illegible] have been known to adopt similar precau[illegible]. On the 9th of July 1804, an observer having [illegible] some of those, belonging to a neighbouring [illegible] lying dead on the board of a swarm that they [illegible] come to pillage, watched the proceedings of [illegible]. On the 11th of the month, they had [illegible] the entrance, leaving only two apertures at the [illegible] above the board, which would admit [illegible] one bee at a time: they were thus [illegible] to the size of their enemies, and [illegible] guarded by two workers. But [illegible] enlarged, and on the [illegible] three bees to pass [illegible] [illegible]

exposed, for they demonstrate the pre-
hould be followed by a cultivator in pro-
es. As the seasons of danger approach,
elf to diminish their entrances, an expe-
vill prove the chief means of security.
riod of swarming, they should be left al-
but after that time, they must be con-
en in danger of being pillaged by their
ere may be only two apertures, each
allow two or three bees to pass: and
here their great enemy, the *sphynx atro-*
the apertures, when the chief collection
s place, must be made very low, that
y be excluded. Some observers have
udinal or triangular cover of the en-
by one corner on a pivot; by simply
epressing which, the access was impe-
ted. An intelligent naturalist recom-
g a slider, containing various aper-
ntrance of the hive: merely by shift-
those suitable to the different seasons
s will be presented for the exit of the

receding remarks, the necessity of fre-
ting hives is evident; not by tearing
e boards, as is usually done, to the
uction of the combs and derangement
colony, but by examining the entrance
nd by using hives of such a construction
em opens to expose what is contained
apparatus of the description proposed
should be kept for weighing the hives
time, that the increase or diminution
. This consists of a steelyard hung to
: from one arm of the steelyard the
ed by three slight chains, and a weight
he other. The common iron spring
be conveniently employed, providing
has been previously ascertained.

ns are peculiarly unfavourable for the
ney, sometimes, we have said, a whole
rish in the middle of summer. Then,
are deprived of too great a portion of
becomes the cultivator's care to supply
. There are various methods of doing
gulating the supply by the number of
emperature of the atmosphere. The
placed above a section of another hive
eral combs with honey; or combs may
boards of the hive before the entrance,
to be recommended from exposing the
provisions to the invasion of stran-
of sugar, treacle, and other sweet sub-
e given them as food, introducing their
ry afternoon in nutshells, or in a ves-
ted covering, by an opening in the back
nless the supply be daily administered,
difficult to preserve the bees; and by
longer intervals, the most skilful culti-
iled. A practical operator informs us,
an oblong box, in one end of which
containing honey, that is allowed to
bottom of the reservoir under a thin
p by cork. This float has many small
through which the bees standing on it supply themselves with the honey. There is one hole in the side of the box, which is to be applied to the entrance of the hive, for admitting the bees above the float, and another on the opposite side, which is opened at pleasure, to allow them to escape, should the box be too much crowded. The lid of the box is a glass pane. On pouring honey into the reservoir, the float rises, whence there should not be such a quantity as to raise it close to the lid or pane above. The box is about ten inches long, four broad, two and a half deep, and the reservoir is an inch wide. When used, the hole in the side is to be placed close to the entrance of the hive, which must be gently rapped on if the bees do not immediately find the way down. It is entertaining to observe bees accustomed to be fed in this manner, watching the approach of the feeder; when the ordinary time draws near, they rush down to the box the moment that it is put on the board, and after speedily filling themselves they return to the hive, from which they very soon come back for a second supply. By throwing a little fine flour on those leaving the box, it will be seen that they can fill themselves in three minutes, and are absent not above five. One convenience that attends feeding in such a box, is the exclusion of stranger bees; as the sole communication with the interior is from the entrance of the hive. Several practical operators recommend a mixture of sugar and small beer as food, which we should warn others to be cautious of adopting, as they will find honey or syrup quite adequate to their purpose. It is maintained that fruit may likewise be presented to bees for feeding them.

Precautions during the period of swarming.

Supposing, by a concurrence of favourable circumstances, that a hive is well provided with bees; that they are protected from enemies, their collections ample, and their brood abundant; the cultivator has to watch it strictly during the summer season when swarming takes place. It is only during the warmer weather that bees swarm, on fine days, and when the heavens are unclouded: if the sun be overcast, they hesitate to depart, awaiting the moment when he shines forth in full lustre. Though what are called precursors cannot be depended on, as we have shewn, they are not to be altogether neglected; and in attending to them the time of swarming will scarcely be overlooked. It is commonly between ten and three o'clock, sometimes a little earlier or later, that a swarm leaves the hive, during which interval the owner should be on the watch to follow it. A sudden buzzing is heard, the bees are seen in innumerable multitudes traversing the air in all possible directions, and the entrance of the hive soon appears deserted. After wandering about for some minutes, they are generally seen in small clusters, on some neighbouring shrub or tree, which gradually unite round the queen, and all are collected together in a single heap. If they rise high in the air, it frequently indicates their inclination to take a long flight, which is usually endeavoured to be checked by beating pans, ringing bells, and throwing dust or sand among them. The former can have little influence; if it does operate, it may be by producing a slight concussion of the air, which, alarming the bees in the same way as thunder, may induce them to settle; but the discharge

of a fowling piece would have much more effect. Bees are conceived to mistake the dust and sand for rain, which they greatly dread; and we often observe them hastening to the hive on the approach of a shower, or when the sky becomes cloudy. Notwithstanding every effort to retain them, they sometimes rise very high, fly to a distance, and are irrecoverably lost. As they are said to fly in a straight line after having taken their direction, they must be pursued, as there is no other method of discovering where they alight. The place of their settling is extremely uncertain. Bonner says they will fly four miles to take possession of a dead hive, and affirms, that he has seen a swarm go into a living one that stood in the same apiary. If they alight in an accessible place, on the branch of a tree for example, after allowing them to settle completely, it must be gently cut off and laid on the ground, and a clean hive supported on two sticks put over it, and the whole covered with a sheet or large table cloth. The bees will soon ascend into the hive, and immediately begin working: late in the evening, when all is quiet within, the hive is to be transported to its station in the apiary. When the cultivator can, by any device, catch the queen and put her into the hive, all the bees will quickly follow. This is more essential to attempt, when the place where the swarm has settled is of difficult access; such as flying to the roof of a house, or the cleft of a tree. Then it is far from easy to dislodge the bees, which is, in the majority of cases, the sole method of recovering them; as we can hardly sanction the following method recommended by Bonner: "The owner should make as much room as possible to get his hand introduced, so as to pull them out by handfuls, and put them into an empty hive." Bees very quickly commence working even in the most exposed and unsheltered situations, unless removed to a hive. The operator should be provided with a dress to protect him from the stings of the bees: the best expedient is to have a close leather jacket and trowsers; the head and face covered, and goggles of gauze to save the eyes. Bees are less disposed to sting during their swarming than at all other times; and there have been instances of their settling on a person's head, unattended by inconvenience. We have an authentic account of this from Thorley. "In the year 1717," he observes, "one of my swarms settled among the close twisted branches of a codling tree; and not to be got into a hive without help, my maid servant, being in the garden, offered her assistance to hold the hive while I dislodged the bees. Having never been acquainted with bees, she put a linen cloth over her head and shoulders, to guard and secure her from their swords. A few of the bees fell into the hive, some upon the ground, but the main body upon the cloth which covered her upper garments. I took the hive out of her hands when she cried out, the bees were got under the covering, and crowding up towards her breast and face, which put her into a trembling posture. When I perceived the veil was of no farther service, she gave me leave to remove it: this done, a most affecting spectacle presented itself to the view of all the company, filling me with the deepest distress and concern, as I thought myself the unhappy instrument of drawing her into so imminent hazard of her life. Had
raged them, all resistance had been vain, and
less than her life would have atoned for the
I spared not to use all the arguments I cou
of, and using the most affectionate intreaties;
her, with all earnestness in my power, to
ground and keep her present posture; in
which I gave her encouragement to hope f
discharge from her disagreeable companions
gan to search among them for the queen, no
a great body upon her breast, about her n
up to her chin. I immediately seized her, ta
from among the crowd, with some of the
in company with her, and put them together
hive. Here I watched her for some time, a
did not observe that she came out, I conceiv
pectation of seeing the whole body quickly
their settlement; but instead of that, I soo
ved them gathering closer together, without
signal for departing. Upon this I immedi
flected, that either there must be another s
or that the same was returned. I directly con
a second search, and in a short time, with
agreeable surprise, found a second or the sa
strove, by entering farther into the crowd, t
me, but I reconducted her with a great n
the populace into the hive. And now th
choly scene began to change, to one infinit
agreeable and pleasant. The bees missing thei
began to dislodge and repair to the hive; c
into it in multitudes, and in the greatest hurry
able; and in the space of two or three min
maid had not one single bee about her, neit
she so much as one sting, a small number o
would have quickly stopped her breath."

Supposing that the cultivator desires to
the number of his hives, without awaiting th
when swarming naturally ensues; or that it
tion is checked by the uncertainties of weat
dominant in our climate above all others, he
sort to the expedient of obtaining artificial
Several young queens originate at once in a h
the production of two is sometimes so im
that although both cannot survive togeth
come off in the same swarm. As by M. S
discovery, bees having lost the queen can
themselves another, providing there be worker
in the combs, we can at pleasure rear s
queens simply by removing the first. If a
strong enough therefore, it may be divided
one half will retain the old queen, and the o
not be long of obtaining a young one. Sh
rects, that the appearance of brood in a hive
ing a queen is to be ascertained, which i
about the time that the trees are in bloss
little later in Britain. Three or four pieces
with the brood, are to be cut out of the
placed in a rack-work, adapted in another hi
same position as in that from which they c
three or four hundred bees must be confin
with it; unless the hive be very large, the
not be numerous; and seven or eight hundre
ways prove more than sufficient. Nearly fift
being requisite for the production of a q
much honey should be supplied every two

subsisting the bees. The hive is then
up and transported to a place where the
is moderate. Violent agitation ensues
ees whenever they discover that they are
and the tumult becomes still greater on
ning that their sovereign is no longer
Silence succeeds, which is next followed
noise and confusion than what attends
Immediately afterwards a new operation
rom the second day the construction of
is seen. The confinement of the bees
racted some days; but on the fourth or
e may be carried into a garden, and the
wed to escape. Their eagerness to do
at hardly one remains in the hive; how-
hours they return to it again. The en-
still be closed at night, and the hive car-
use, unless the fineness of the weather
being left without. If the operator, on
hive, finds the brood hatched, and the
advanced, he should transfer the whole
e bees into a dwelling of greater capaci-
a small box has been used with three or
f white wax fixed near the top, that the
resemble a hive containing work already

Should the queen be hatched, it will
operation if she can be transferred to the
: and thus the artificial swarm is form-
ficult to perform this operation with the
w hives; but an expert person may ac-
y means similar to those adopted in rob-
of their provisions.—Here the use of the
hive is especially demonstrated; for it
ies in forming artificial swarms infinitely
ny others that have yet been devised.
nditions above specified, of brood and
the leaf-hive is to be gently separated in
nd two empty frames insinuated between
The queen must then be sought for in
alves, and a mark put on her, in order
ake. Should she by chance remain in
with most brood, she is to be transferred
containing less, that the bees may have
of obtaining another female. Next, it
o connect the halves together by a cord
ound them: and care should be taken to
n the same board which the hive pre-
pied. The old entrance, now become
be shut up; but as each half requires a
se ought to be made at the extremities
ivisions, on purpose to be as far asunder
Both, however, should not be made on
. The bees in the half deprived of the
t to be confined twenty-four hours, and
nade before the lapse of that time, ex-
admission of air; otherwise they would
or the queen, and infallibly find her in
ision. But provided twenty-four hours
o make them forget their queen, this
en. When all circumstances are favour-
in the division wanting the queen will
ur in procuring another; and about fif-
r the operation, as before observed, their
epaired. "The young female they have
rding to Huber, "soon issues forth to

seek impregnation, and in two days commences the laying of workers' eggs. Nothing more is wanting to the bees of her division, and the success of the artificial swarm is ensured." The time of resorting to this expedient is, when the males are about to originate or actually exist: if attempted earlier, the bees will be discouraged by the sterility of their young female. The structure of the leaf hive enables us easily to ascertain the concurrence of the necessary conditions; for by simply opening the frames successively, their whole contents are exposed to view.

Substitution of a new queen.

Should the original queen be accidentally lost or destroyed, the cultivator has still another means of preserving the whole colony, which, destitute of workers' brood, would infallibly perish, by substituting a new one in her place. Bees are not immediately sensible of the loss or removal of their queen; their labours are uninterrupted; they watch over the young, and perform their ordinary occupations. But in a few hours agitation arises; all appears a scene of tumult in the hive; a singular humming is heard; the workers desert their young, and rush with delirious impetuosity over the surface of the combs. Then they discover that their queen is no longer among them. There can be no question that this agitation is the consequence of bees having lost their queen; for should she have been intentionally removed, tranquillity returns on restoring her, and, what is very singular, she is recognised. If a stranger queen be introduced after the reigning one is lost or taken away, the agitation continues; the stranger is surrounded, seized, and kept captive by the bees in an impenetrable cluster, where she usually dies either of hunger or from the privation of air. If eighteen hours elapse, the stranger is at first treated in the same manner, but with less rigour; the bees gradually disperse, and she is at last liberated. But should there be an interval of twenty-four hours after the loss of the original queen before the stranger one is substituted, "she will be well received," to use the words of an eminent author, "and reign from the moment of her introduction into the hive." On this head, which it is extremely important for the cultivator to be intimately acquainted with, we are indebted to Huber for some interesting experiments. On the 15th of April, he introduced a fertile queen, eleven months old, into a glass hive, where the bees having been twenty-four hours deprived of their queen, had already begun to construct twelve royal cells. Immediately on placing the stranger female on a comb, the bees in the vicinity touched her with their antennæ, and passing their trunks over every part of her body, supplied her with honey. These then gave place to others, by which she was treated exactly in the same manner. All vibrated their wings at once, and ranged themselves in a circle "around their sovereign." Hence resulted a kind of agitation, which gradually communicated to the workers situated on the same side of the comb, and induced them to come and see what was going on. Soon arriving, they broke through the circle formed by the first of their companions, approached the queen, touched her with the antennæ, and gave her honey. After this little ceremony, they retired, and, standing behind the others, enlarged the circle. There they vibrated their wings, and buzzed as if experiencing some very agreeable sensation. In a quarter of an hour the queen began to move from her original position, when the bees, so far from opposing her, opened the circle at that part towards which she turned, and formed a guard around. While such incidents occurred on the surface of the comb where the queen stood, all was quiet on the other side. Here the workers apparently were ignorant of the queen's arrival in the hive. They laboured with great activity at the royal cells, as if still ignorant that they no longer stood in need of them; they watched over the royal larvæ, supplied them with jelly, and the like. But the queen having at length repaired to this side, she was received with the same respect by the bees as she had experienced from their companions on the other side of the comb. They encompassed her, gave her honey, and touched her with their antennæ; and what proved better that they treated her as a mother, was their immediately desisting from work at the royal cells; they removed the worms, and devoured the food collected around them. "From that moment the queen was recognised by all her people, and conducted herself in this new habitation as if it had been her native hive." Thus when bees have had time to forget their own queen, they receive one substituted for her with greater interest, or, perhaps, with more conspicuous demonstrations of it. The cultivator must, therefore, carefully practise one of two things when a queen is wanting in any of his hives; he has either to procure a new one by supplying the bees with brood comb, whereby the loss will be repaired in about fourteen or fifteen days, or he must substitute some supernumerary queen, in which case the impending evils will be completely averted in twenty-four hours.

Uniting swarms.

If two clusters of bees form in swarming, and remain quite separate and distinct from each other, it shews that two queens have left the hive at the same time. But no single swarm being too large, it is necessary, for the welfare of the community, that one of the queens be sought for, and sacrificed, on which the whole bees will unite. There are other situations when it is also beneficial to join two or more swarms together; such as when they are weak on leaving their hives in the summer season, or are sparingly provisioned or peopled towards winter. Numbers, we repeat, independent of affording a better security against external enemies, and in promoting the general activity, are more calculated in society to resist the inclemency of the weather. Those persons, therefore, who cultivate bees solely for the sake of profit, estimate according to the weight of a hive whether it be sufficiently strong. Hives under four pounds, being supposed to contain about 20,000 bees, are rejected; but Bonner affirms, that one consisting of 15,000 will do well, providing the season be not far advanced. The reader will not forget what we have observed of the discrepancies among naturalists concerning the number of bees in a given weight. The last mentioned author, who was a practical operator in uniting swarms, directs, that the mouths of two hives, the lower one full and the higher empty, are to be applied to each other, and a sheet, or large cloth, put round them. "The undermost hive must then be rapped with both hands, in the manner a drum is beat; rapping chiefly on those parts of the hive to which the edges of the comb are fixed, and avoiding the parts opposite to the sides of the combs, lest they should be loosened, and, by falling together, crush the bees between them, as well as the young in the cells. The more bees there are, the sooner will they run into the new hive; for the concussion of the hive by the rapping alarms them as an earthquake alarms mankind, and they run to the upper hive in search of a safer habitation. When the bees are thus removed into the new hive, it may be placed where the old one stood, which will collect all the bees together, and within ten minutes the bees will begin working as leisurely as any natural swarm." By this means the under hive will be left quite empty, and another may be substituted, in order that three swarms shall be united. Clusters of bees may also be introduced into a hive to strengthen it, and they are generally received without fighting. While the bees are very active, the places of a strong and a weak swarm may be interchanged; the number of the former which are out being much greater, will return to the latter as their own dwelling, and thus strengthen it. There is likewise an easy and simple method of uniting swarms, which consists in spreading a cloth at night on the ground, close to a hive where two new swarms are to be joined. One of them is to be brought, and put on a stick laid across the cloth, when, giving their hive a smart blow, they will drop down in a cluster. This done, and the empty hive thrown aside, the other should be expeditiously taken from its board, and set over the bees, which will speedily ascend into it, and unite with its inhabitants. By the means here described, a swarm may be increased to any given extent. Bonner assures us, that his mode may be practised in the middle of the day with little danger, and that he has taken off four swarms in one forenoon without a single sting.

It is ungrateful to reflect, that, after all our care in watching the progress of bees, in screening them from injury, added to our admiration of their singular industry, we must at once sacrifice so many thousand lives in order to come at their stores. Yet such is the general, though pernicious practice; and whole colonies, which, in another year, would send forth tens of thousands equally industrious as themselves, are utterly extirpated. The mode of doing so is well known. When the hives cease to increase in weight, or, rather, when they begin to grow lighter, a hole is dug in the ground, and some rags dipped in melted brimstone being inserted in the clefts of twigs stuck into the earth, the matches are kindled, and, putting the hive above them, the bees are quickly suffocated, and fall down in a heap. Some authors strenuously defend this practice, contending, that all expedients to save the bees are both difficult and precarious, and that they do not produce the same advantages. We conceive that its facility, combined with inveterate adherence to established customs, has proved a strong recommendation. But the majority of modern cultivators are disposed to preserve the bees, while they share their collections. Towards the end of September, when all the flowers have faded, when there is little brood in the combs, and the bees are beginning to consume the honey they have laid up, they may

ghtened out of the hive by beating on it, and
ombs then safely taken away. This, however,
l reduce the owner to the necessity of feeding
during winter, whence an earlier season is gene-
chose for it, that the bees may still have time to
winter provender. The highest part of a hive
always filled first, and with honey of the finest
y, it may be taken in the midst of summer
bees are kept in boxes, simply by removing the
one, and substituting another below, if that
quired. As every comb is seen in the leaf hive,
ne of the whole can be removed at will, and
ivisions inserted. The stores of the bees should
derately partitioned with them, and due regard
s paid to the advancement of the season, and
ate of the atmosphere. We cannot tell how
they will produce. Thorley declares, that, in
summers, he has taken two boxes from one hive,
containing thirty pounds of honey. We hear of
weighing seventy, eighty, or even an hundred
s; but these bear no comparison with what M.
mel relates. A clergyman in France, who had
l a well-stocked hive over an inverted tub with
in the bottom, obtained no less than 420
s of honey and six of wax from it. The cul-
should know the exact weight of his hives,
ark their gradual increase or diminution, which
able him to ascertain the proper time of taking
ney. Bonner judiciously observes, that "the
t of honey, like that of corn, is earlier or later,
plentiful or scarce in different years, according
weather and the climate, and the variety of
asons and situations." Sometimes he has known
become gradually lighter after the first week
gust; at other times, in favourable weather,
situated near heath have continued working
ly during the whole of August, and the greater
f September, and daily become heavier.

he practical separation of honey and wax we need
tle, as it is universally understood by those who
ate bees for profit. That honey which is most
and runs most easily from the comb, is consider-
best and finest. To promote the separation of
st, the combs should be cut into very small
ns, and exposed before a fire, to render the ho-
ore liquid; the product will be honey of the
l degree of fineness; and the remainder should
ted still more in a vessel over a fire, and then
zed through a canvas bag, which will produce
ser kind, well adapted for feeding bees. It fa-
es the operation, to erect a stage of three or
ieves, one always finer than the other from the
nd in a short time the separation is effected.
y comb, wrapped in paper, and kept in a cool
may be preserved entire during a whole winter
ger. To purify the wax, nothing more is ne-
y than boiling the empty combs, and those de-
of the honey, in water, and removing the scum
will rise in the successive meltings. The Abbe
Rocca proposes to put a quantity of comb,
p in a linen or woollen bag, into a cauldron of
; as the heat increases, the wax liquefies, and,
ng through the interstices of the bag, rises
surface, while the refuse is retained behind.

This is a simple, and, as we conceive, very effectual method.

We apprehend that very few precautions are necessary for preserving bees in winter. They are not torpid in that season provided they be numerous, and then they cluster together towards the top of the hive. But, like other insects, they are liable to torpidity when single, or where there are few collected together, and that torpidity, by an extraordinary increase of cold, will end in death. With the view of saving their provision, it has been proposed to keep bees torpid, or in an ice-house all winter. It is undoubted that in a certain degree of cold they cease to consume honey, and animals may live an indefinite time in a state of torpidity. The hives ought not to be exposed to sunshine in the depth of winter, for the bees are induced to go out, and the sudden cold that follows deprives them of the power of returning.

The cultivation of bees forms one considerable branch of rural economy, and we could wish to see it much farther extended. This country is capable of supporting at least four or five times the number of hives now kept in it; and, without indulging in the speculations of extravagant profit, which are generally entertained by the authors who write on the subject, we will confidently affirm, that every one who attempts keeping bees on a moderate scale, and pays them some attention, will find it advantageous. There are repeated instances of bees swarming naturally three times during a season; and in the present year, 1810, we have known five swarms come from a single hive. Bonner calculates, that 20 stock hives in each parish of Scotland, or 16,000 in all, would, in seven years, by each merely producing one swarm, augment to above two millions and forty-eight thousand. He allows a deduction of forty-eight thousand for losses, which leaves two millions of stock hives. The loss, however, would be much more considerable; but from the parishes being about a fifth above what he supposes, the difference will not be proportionally great. Such an increase could hardly follow, and some unfavourable years might be destructive of most of the stock; yet, on the whole, the hives would be numerous compared with what they were in the outset. By another calculation, he supposes an individual purchasing five hives at £1 each, will obtain, in ten years, 2560 swarms, which, valued at 10s. each, makes a profit of £1280. He supposes that each hive gives one swarm annually; if they give more, that the latter are to be allotted for expenses and incidental losses. But in similar calculations we should hardly look further than three years; and it is quite moderate enough to say, that each hive will give one swarm, which may be preserved until the end of the third year. Therefore, as the price of hives in this year, 1810, is £2, 2s., supposing a stock of ten is obtained, it is far from improbable, that, at the end of the third year, it will be found to have increased to eighty; and it is likely, also, that other thirty or forty swarms have left the stock hives, or that first swarms have sent out a colony. The reasons we have already given shew why an excessive number of bees cannot be maintained in one place; and speculations in rearing them should be divided among several individuals residing in different districts. The trade of foreign countries in wax is very considerable; and the increasing demand for it may render the culture of bees more worthy of notice at home. In the year 1806, there was exported from the port of Mogadore, in Africa, 234,555 pounds of bees wax.

The honey bee is frequent in the wild state in warmer climates, but is very rarely to be found in Britain; nevertheless it is said to exist, and that a hive was discovered within these some years. Thus the animal may have either been domesticated at a very remote period by the inhabitants, or it may have been brought from abroad. Naturalists doubt whether the wild honey bee is a native of America, though existing in numbers in the woods. It is rather supposed to have been carried thither in the sixteenth or seventeenth century. Honey is said to be a great article of subsistence in Madagascar, and in other places where bees are common in the clefts of trees. In Africa, there is a small bird called *cuculus indicator*, or the honey bird, which, uttering a peculiar note, and flitting from bough to bough, will infallibly lead the traveller to a swarm in some hollow of a tree. See Swammerdam *Biblia Naturæ*. Maraldi *sur les Abeilles, Mem. de l'Academie des Sciences*, 1712. Reaumur, *Memoires pour servir a l'Histoire des Insectes*, tom. v. Schirach, *Histoire Naturelle de la Reine des Abeilles*. Bergman, *De Apibus et Mellificii vicissitudinibus ex Alveorum ponderatione æstimandis: Opuscula*, tom. v. Ray, *Memoire sur l'Histoire des Abeilles, Journal de Physique*, tom. xxiv. Bonnet, *Œuvres*, tom. v. Della Rocca, *Traité complet sur les Abeilles*. Butler, *The Feminine Monarchy*. Hartlib, *Commonwealth of Bees*. Thorley, *Inquiry into the Nature, Order, and Government of Bees*. Wildman *On the Management of Bees*. Bromwich, *The Experienced Bee Keeper*. Bonner, *A new plan for speedily increasing the number of Bee Hives in Scotland*. Huber, *New Observations on the Natural History of Bees*. See also Apis.

The indistinct descriptions which some travellers give of the bees of different foreign countries, render it difficult for us to determine whether the real honey bee is meant or not. It is true, they describe such bees as being the same; but they maintain, that one species wants a sting, and that another nestles in the earth with its honey. So far as naturalists have yet ascertained, neither of these peculiarities belong to the honey bee; but it is extremely probable, that besides the single species which we keep in hives, others might be domesticated. One kind is found in Surinam, which hives in very numerous societies. These construct a nest eight or ten inches in diameter, and eighteen or twenty long, towards the top of trees of moderate height. Within are found large cells of a [illegible] reddish liquid honey, in great abundance. The nests, which resemble a lump of earth applied against the tree, cannot be procured unless the tree be cut down, when the natives of the country, after using the honey, and making a kind of mead, roll the wax [illegible].

There is a species of bee which collects the honey [illegible], and stores it up in cells, though we may doubt [illegible] intended for its winter provision. This is called the humming or humble bee; an insect so common in Britain as to have attracted the attention of every one. Like the honey bee, it lives in societies, consisting of from twenty to an hundred males, females, and what are supposed neuters. We have never found the society more numerous in Scotland, and the continental authors seem to describe it as smaller. These societies either dwell in cavities of the earth, or in tufts of moss collected together on the surface; or sometimes those whose proper habitation is in such cavities, are content with a hollow of the ground, where they cover themselves with moss and bits of leaves; or we have seen them effect a lodgement in a wooden box, some feet above the ground, in which they appeared to have themselves collected moss and leaves, and there bred a considerable colony. In reverting to the origin of these societies, we are opposed by very considerable difficulties. It seems probable, that a single female, which has been accidentally preserved through the winter, is the parent of the whole, and that she selects the spot, or cavity, for her posterity. No naturalist has, we believe, yet beheld a nest in its origin, though it has been seen when consisting of few cells. Reaumur relates, that on one occasion he removed the whole combs from a nest, and completely evacuated the interior. Nothing was visible for several days; but after the bees had remained eight days undisturbed, a lump of paste and farina the size of a nut was found in it, attached to which was a pot of honey; that is, a half made cell, which the bees at times construct, and in which some of their honey is kept. Thence, and from other circumstances, it is conjectured, that the mother proceeds to collect a quantity of farina or pollen, in the midst of which her eggs are laid; and by their coming to maturity after a certain time, the colony is constituted and enlarged. Several females inhabit the same nest, living in harmony together. They are occupied in collecting honey; and are easily known, from being the largest of all the three species. The males are smallest in size; always of a lighter colour; and are capable of making wax. The workers are of various sizes in the same nest, some not being half the size of others. Nature does not require the like sacrifice in the males of humble bees as in those of the honey bee to propagate the species; the sexual union takes place according to the common mode of insects: neither is there any massacre among them. Females and workers are much less disposed to use their stings than the honey bee: here, also, the males have none.

On opening a nest containing a colony of humble bees, a confused and mishapen aggregate of ovoidal substances is disclosed, interspersed in various parts with crude masses of wax, and cells of honey. These ovoidal substances are the young coming to maturity within a silken coccoon coated with wax; and amidst some of the lumps of wax are found larvæ, which one author thinks are there for the purpose of being fed, and another for being preserved from cold and humidity. The eggs are deposited in cells, which the workers lend their aid to construct; and the mother herself completes them, smoothing and polishing the interior. When she prepares to lay in a cell, the workers, unlike that care which those of common bees bestow on the eggs of their queen that are to preserve the colony, eagerly endeavour to devour them. The moment that the eggs are deposited, and the female is about to close the cell with a waxen covering, they rush upon it, and are repulsed only by her defence; or, if she removes during an instant, they steal thither, and surreptitiously carry off the eggs. The female is, therefore, under the necessity of keeping incessant watch during several hours, after which she may leave the cell; for it is only in their first stage that the eggs are sought for with avidity by the common bees. Sometimes twenty eggs are deposited by a female in a single cell, which is then closed; but it does not appear that the bees are careful to provide the young with a sufficient store to serve them until their ultimate metamorphosis; for the mother supplies a thick layer of pollen whereon her eggs are deposited, which is soon consumed by the larvæ. After being hatched, the common bees make a small hole in the top of the cell, and then go in quest of honey or pollen. This they obtain from the rest of their combs, and seem to introduce it by the opening to feed the young; they then withdraw, and close the cell. Some cells acquire perceptible increment; from being very small they become as large as a nut; which results from the included worms, perhaps six or seven in number, successively bursting the cell, and the cleft being as often covered over with wax by the bees. When the young bee has attained its perfect state, the workers gradually contract the mouth of the cell it has left, and lay up their honey in it. Other cells are also constructed of pure wax, which are so many reservoirs of honey from the beginning, and have never contained young.

Humble bees form a very considerable quantity of wax; and the observations of naturalists regarding them has thrown some light on the production of this substance. Several species, both of those that dwell in cavities of the earth, and those that inhabit nests covered with moss on the surface, invest their whole combs with a waxen envelope, so as to serve for a protection. It rises around their combs like a kind of wall, and constitutes both a floor and a roof, at such distance from the cells as to admit of the bees passing. When their envelope is destroyed, the bees restore it with wonderful assiduity. An observer by removing it four times in nine days, obtained as many new coverings, which formed eight inches square; and in four or five days more they made a new one, which, along with the others, weighed 365 grains. Instead of this covering, however, they are frequently obliged to be content with moss or leaves. Females produce a greater quantity of wax than any of the other individuals in a nest; but the males produce it also, though they cannot, like the females and workers, convert it to use. The wax of humble bees is an immediate production from the honey on which they feed. M. P. Huber, the son of the eminent naturalist of that name, inclosed a certain number of humble bees under a glass receiver. They ranged themselves in a circle around some honey which they were supplied with, and, extending their trunks, fed during ten or fifteen minutes. Then they brushed themselves with their feet, to be freed of the particles of wax which transuded between the rings of the body. Repeated experiments proved, that it was instantaneously produced, and the same bees afforded a quantity daily.

Humble bees are remarkably subject to torpidity, and perhaps might be the means of illustrating the difficulties attending all investigations into its operation on insects. Towards the end of autumn they are seen languid and inactive on the few remaining flowers, incapable of defending themselves from injury. The life of the whole apparently terminates with the season, unless it be from some accidental circumstance, as we have already observed, that a few of the females are preserved. How they survive the winter we know not; possibly it may be in the earth, or in the holes of walls; but the number must be very small. Were they not in torpidity they would fly about during the winter, which is never seen; and the same degree of heat would awaken the whole, or there would be no considerable difference, unless by their being farther withdrawn from the influence of the atmosphere. Very few, however, appear in spring; and it is not until the heats of summer, or rather later, that they become numerous. The casualties to which these and many insects are exposed, render it far from improbable, that various species gradually become extinct. See Gœdartius *De Insectis*. Swammerdam, *Biblia Naturæ*. Geoffroy, *Histoire Abregée des Insectes*. Reaumur, *Memoires*, tom. vi. P. Huber *On Humble Bees: Transactions of the Linnæan Society*, vol. vi. (*c*)

BEEN, the name of a musical instrument used in India, resembling the guitar. See *Asiatic Researches*, vol. i. p. 295. (*w*)

BEER. See BREWING.

BEERING, BEHRING, or BERING'S ISLAND, lies in the North Pacific Ocean, in 55° North Lat. and about 167° of East Long.: the southern extremity bearing north 67° from the harbour of St Peter and St Paul, 192 miles distant. It is 104 miles in length, and 15 in breadth: the west side mountainous, but the northern point low land: the mountains are of granite and sandstone, and in their recesses contain many caverns. There are two bays in the island, whither merchantmen engaged in the fur trade are wont to winter; but they are shallow, of dangerous access, and exposed to the north winds. Minerals of value have been said to exist here; and sometimes after violent storms, pieces of native copper are cast ashore.

This island, which some geographers incline to unite to the Aleutian isles, while others detach it from them, was discovered by Commodore Behring, a Dane, who is mentioned in the subsequent article. He and Captain Tschirikow left Kamtschatka on a voyage of discovery, in 1740, and sailing northward, made the coast of America, in 60° of North Lat. They afterwards encountered continued tempests, in which they

Beering's Island.

lost their reckoning, and were tossed about in unknown seas. In endeavouring to regain the coast of Kamtschatka, they came in sight of Behring's island, in November 1741, under circumstances of uncommon distress. Great sickness prevailed among the ship's company; and the Commodore himself, incapable of motion, was carried ashore by his people. But the island being utterly destitute of shelter, they had recourse to holes in the ground between the rocks, which they covered over with sails, to exclude the rain and snow, it then being the winter season. Behring was lodged in one of the most commodious of these, and a kind of tent was erected over him. But the sand within the hole falling down, covered his feet every moment: at first it was removed; thinking, however, that it somewhat promoted the vital warmth, he would not allow it to be taken away. Thus he remained until the gradual accumulation of the sand covered him up to the belly, and then he sunk under the severity of hardships, combined with a painful and lingering disease. His remains were actually dug out of the earth, that they might be restored to it in a manner more creditable to the memory of a gallant officer; and to preserve them from being devoured by ravenous beasts of prey. Many more of this unfortunate crew fell victims to the same evils; and among them M. de la Croyere, an astronomer, who had embarked for the purpose of discovery. On board also was M. Steller, a naturalist, one of the royal academicians of Petersburgh, to whose narrative we owe some of these particulars, though he did not himself survive to return to that metropolis. To complete the disasters of the Russians, their vessel was totally wrecked, and they were compelled to winter on Behring's island, almost entirely destitute of shelter. At length they contrived to build a bark out of the fragments of their ship, in which the survivors reached Kamtschatka. It is not to Behring only that the island, bearing his name, has proved fatal. In the year 1787 or 1788, an English vessel, built solely of mahogany, (as is said,) commanded by Captain Peters, sailed from Bengal, with the design of collecting copper at Behring's or Copper island. After a successful traffic with Kamtschatka, Oonalashka, and other parts of the Russian dominions, she was cast away on the former island; and of the whole company, consisting of 70 men, only a Portuguese and a Lascar were saved. On Behring's first arrival in this island, it swarmed with black and blue foxes, which never having had to dread the destructive hand of man, were perfectly tame. They ravenously devoured the dead animals thrown ashore by the waves; and the Russians, in contending with them for what was to prove their own subsistence, had sometimes to destroy two or three at once with their knives: before they could inter their deceased companions, also, the hands and feet were often gnawed from the bodies, by these rapacious creatures. Several marine animals frequented the shore, especially the sea otter, whose skin is extremely valuable, and bears a high price in China. Before they had likewise learned to dread their enemies, 900 of their skins were collected, and afterwards turned out a great prize to the Russians. When the sea otter disappears in March, it is replaced by great numbers of the sea lion, and several tribes of phocæ. The sea cow was commonly an object of pursuit, by Russian adventurers to Behring's island; but the race has either been extinguished, or is deterred by danger from approaching the shore, and none have been killed since 1768. Whales are extremely numerous in the surrounding seas: a dead one cast up, formed for some time the principal article of subsistence of Behring's crew. (*c*)

BEERING, Behring, or Bering's Straits, a celebrated channel 39 or 48 miles in breadth, which separates the two great continents of Asia and America, in North Latitude 65° 50′, and East Longitude 191° 50′: bounded on the Asiatic side by the projection of East Cape from the country of the Tchutski, and on that of America by Kigmil, or Cape Prince of Wales. A problem had long been agitated among geographers, whether the Asiatic and American continents were united towards the north, or divided by a navigable sea. When Peter the Great of Russia was in Holland, in the year 1717, he was solicited to send an expedition to the northern regions, whereby this point might be determined; and to satisfy the wishes of those interested in discoveries, he acceded to their desire. On returning to Russia, he did not forget his promise, and, with his own hand, framed a set of instructions, which were delivered to Admiral Count Apraxin to be carried into execution. The purport of these was, first, to construct one or two decked vessels in Kamtschatka: Secondly, that the unknown northern coasts should be visited for the purpose of ascertaining, if Asia was joined to America: And, thirdly, that some European port should be gained; and an accurate journal kept of all that occurred, together with a description of the places. But the death of this distinguished potentate interrupted the project.

Meantime, on recurring to earlier periods of history, it seems extremely probable, that the fact had been already ascertained; and that this channel, separating the two continents, had actually been navigated. In 1636, mariners from Siberia began to traverse the Icy Sea, and successively recognised the rivers Alsey, Indigirka, and Kovima, which fall into it. Immediately after discovering the last, they became desirous of extending their discoveries still farther, in the hope of levying tribute from whatever inhabitants might be found; and in 1646, a company of adventurers embarked from the Kovima. Steering to the east, they reached a bay, where they trafficked with the Tchutski tribe; but not understanding their language, none ventured on shore among them: and content with the success of their voyage, without proceeding further, they returned to the place of their departure. The prospect of a profitable trade, led to a second adventure, on a larger scale, in 1647 or 1648. Seven vessels were equipped, in one of which was Semeon Iwanow sin-Deschnew, a Cossac, to attend to the interests of the crown; and in another, a supercargo on account of the merchants. At that time a numerous people was believed to dwell on the banks of the Anadyr, a river known little more than by name, which was thought to discharge itself into the Icy Sea. The fate of four of the vessels is unknown: that containing Deschnew, arrived at a great point of land, lying east north-east, and turning round towards

Beering's Straits.

the river Anadyr; opposite were two islands, on which were men of the Tchutski tribe, remarkable from having the teeth of the sea-horse stuck through their lips. With a fair wind, Deschnew supposed it possible to reach the river Anadyr in three days; nor would the journey by land probably occupy longer, as the river falls into a gulf. In coasting along the point, one of the barks was wrecked; but the crew being saved, were partitioned into the other two; subsequent to which the adventurers had an engagement with the Tchutski. Deschnew soon lost sight of his consort; and after struggling with tempests, was himself cast away apparently to the south of the Anadyr. He and the survivors of his company underwent great hardships; they wandered long in quest of the river, which, at length having found, they built a pallisadoed habitation, or ostrog, and reconnoitred the surrounding country. Another troop of adventurers, marching overland from the Kovima in search of the Anadyr, with the same view of tribute, joined the party there when least expected, in 1650. From these facts we can entertain little doubt, that what has been judged a discovery of the seventeenth century belongs to that preceding it; and, independent of this relation in particular, added to probable circumstances that Deschnew's consort was wrecked on the coast of Kamtschatka, there are corroborative relations of a subsequent period. It appears, that the Russians and the Cossacs in their service had been oftner than once on Tchutski Noss, or the great promontory opposite to America, across which one party marched, and describe the journey as short; that they were even aware of the islands lying in Behring's Straits, and that the continent lay beyond them to the eastward. All these things have since been proved by the most modern navigators.

Though the proposed voyage of discovery had been interrupted by the death of Peter, the design was speedily revived by the Empress Catharine, and its execution entrusted to Captain Vitus Behring, a Dane, in the Russian service. He departed from Petersburg along with two lieutenants, Spangberg and Tschirikow in 1725, and wintered at Tobolsk in Siberia, waiting the breaking up of the ice, that he might descend the rivers, and proceed to Kamtschatka. He was unable to reach this country before 1728, when he built a shallop, and furnished it with provisions sufficient to serve forty men during a year. Behring coasted along the north-east of Kamtschatka, framing, at the same time, an accurate chart of his voyage, which is yet esteemed one of the best extant. In latitude 64° 30′, he fell in with a baidar or canoe, carrying eight men of the Tchutski tribe, with whom he spoke, by means of a Koriak interpreter. They came on board to learn what the Russians had in view, and made some communications concerning the direction of the land, speaking of an island also which lay in their route not far from the shore. On the 15th of August, after twenty-six days sail, Behring made a cape in north latitude 67° 18′, beyond which, as the Tchutski had told him, the coast trended to the west. He thence concluded, that he had reached the north-east extremity of Asia; that the coast farther on would always trend to the west; and this being the case, there was no connection between the Asiatic and American continents. Believing therefore that he had fulfilled the object of his mission, he addressed the officers and ship's crew, representing, that it was then time to think of their return; should they advance farther north, they might be surrounded by the ice, from which it would be no easy matter to extricate themselves; that the fogs which prevailed in autumn, would embarrass them; and even should adverse winds oppose their progress, it was scarce possible to reach Kamtschatka, and to winter in that country would endanger their safety. The force of Behring's reasoning convinced his people, and their course was altered to the south. Nothing remarkable occurred in the voyage, except their meeting with four baidars containing forty Tschutkis, with whom they had an amicable interview, and presents were mutually interchanged. Behring took up his quarters a second time in Kamtschatka, where the natives told him of a land existing farther to the eastward; and he saw pines which did not grow on this territory floating on the waves. He was thence induced to undertake a second voyage when the season admitted; but untoward incidents forced him to abandon it; and after a painful journey overland, and descending rivers on rafts, he reached Petersburg in 1730. We have already seen the disastrous termination of the third voyage, undertaken for more extensive discoveries in 1741, and we hear nothing more of a passage through the Straits until 1764. It is reported, that a mercantile company established at the mouth of the river Kovima, at that time sent out some persons for the purpose of traffic, who doubled Tschutski Noss, (or East Cape) in 74° of north latitude. Sailing to the southward, they passed through a strait to some inhabited islands in 64° north latitude, which they supposed belonged to the continent of America, and traded for beautiful furs with the natives. There is probably an error in the latitude, which is too high, and which would have conducted the navigators to a part of America where no opening is yet known; but they certainly passed Behring's Straits, and they were met by another party on a commercial voyage from Kamtschatka.

In 1778, our celebrated navigator, Captain Cook, passed the Straits, endeavouring to get farther to the north; and after his decease, Captain Clerk, in the subsequent year, repeated the attempt, in which he was checked by the ice, and forced to return. These navigators bestowed the name on this channel which it now bears, in honour of its reputed discoverer, and settled what had been the subject of so much controversy among geographers respecting the separation of the two continents. Contrary to the opinion generally received, they fixed the longitude of East Cape in 190° 22′, and made the width of the Strait thirteen leagues. East Cape forms a lofty peninsula, connected to the continent by a narrow neck of low land. Great similarity was remarked between the two continents to the northward of the Straits; both being destitute of wood, the shores low, and mountains to a great height appearing farther up the country. A slight current from the westward ran in the Straits, and the greatest depth of water was between 29 and 30 fathoms.

Begemder.

The late Empress Catharine of Russia sent out a secret expedition in 1785, for the purpose, among other things, of ascertaining the situation of the islands between the two continents. The commanding officers were provided with the journals of all former navigators, but the extent of their nautical discoveries seem to have been limited. In August 1790, this expedition reached Behring's Straits; and made some detached observations without passing through them. The distance between the two continents was calculated to be forty-eight miles, which differing from the opinion of Captains Cook and Clerk, leaves us in uncertainty with regard to the truth. Possibly the line is taken from the two promontories, one of which lies considerably north of the other.

Three small islands lie in the mid channel of the Straits; the first called Imalin, bearing 26° S. E. 24 miles distant from the eastern promontory; the next, which is the largest, Imaglin, lies six miles further, in a north-east direction; and Okiavaki, the third and smallest, is ten miles distant, south by east. Near the southern entrance of the Straits, King's Island is situated; it is lofty, with a broken and irregular summit.

The discovery of Behring's Straits would have been attended with important consequences, did it not appear that immense fields of ice, never melting in the northern seas, oppose all attempts to navigate the higher latitudes. See Muller, *Voyages et Decouvertes faites par les Russes*, tom. i.; Cook's *Third Voyage;* Billing's *Voyage;* Coxe's *Russian Discoveries.* (c)

BEGEMDER, a rich and valuable province in Abyssinia, is bounded on the north by Balysan, a district adjoining to Samen; on the east by Lasta and Angot; on the south by Amhara, which runs parallel to it, and from which it is separated by the river Bashils; and on the west by Dembea. According to Mr Bruce, Begemder is 180 miles in its greatest length, and 60 in breadth; but in this extent he includes Lasta, which belongs more properly to the province of Samen. Begemder abounds in iron mines, and is well stored with beautiful cattle. Its mountains are less steep and rocky than those of the other provinces, (if we except Lasta,) and abound in wild fowl and game. Its inhabitants are esteemed the best soldiers in the empire; but their rudeness and ferocity are proverbial even in Abyssinia. The south end of this province is cut into prodigious gullies, apparently by floods; but of these floods no tradition exists. It forms the great barrier against the encroachments of the Galla, who have often endeavoured in vain to gain a settlement there: whole tribes of them have been cut off in the attempt. Favour alone is necessary to procure the government of many of the provinces in Abyssinia: others are given to poor noblemen to enable them to repair their fortune: but the consequence of Begemder, from its vicinity to the metropolis, is so well understood, that none but noblemen of rank and character, able to maintain a large army, are entrusted with its government. Several small provinces have been dismembered from Begemder, particularly Foggora, reaching from south to north about 35 miles, and about twelve miles from east to west, from the mountains of Begemder, to the
lake Izana. On the north of this, are tw
vernments, Dreeda and Karoota, the latte
is the only territory in Abyssinia whi
wine. See Bruce's *Travels in Abyssini*

BEGHARDS, the name of some of
sectaries, who so frequently disturbed t
lity of the church. See Mosheim's *Cl*
vol. iii. p. 86.

BEGONIA, a genus of plants of the
nœcia, and order Polyandria. See Bota

BEGUINS. See Mosheim's *Church*
iii. p. 232.

BEHEM, Behеim, Boehme, Behin,
ira, Martin, a navigator and geogra
fifteenth century, to whom the credit of
America has been ascribed, in preference t
of Christopher Columbus.

Behem was born at Nuremberg, in Ge
noble family, some branches of which are
From infancy he betrayed a peculiar pre
the study of astronomy and navigation
taining a maturer age, he began to concei
tipodes and a western continent might po
Nothing could be more favourable for
spirit of enquiry, than his being the pupi
lebrated John Muller, or Regiomontanus
are preserved in the archives of Nurembe
that, under these impressions, he offered his
a voyage of discovery, to Isabella, daugh
I. king of Portugal, and regent of the du
gundy and Flanders. This princess acco
vided him with a vessel, in which he tr
western seas, and in 1460 discovered th
Fayal; so named from the beech trees,
in Portuguese, with which it abounded
discovered neighbouring islands called by
from the number of hawks seen on them.

Behem obtained a grant of the island of
Isabella, and establishing a colony on it, r
about twenty years, during which time h
pied in making further discoveries. In
years before the enterprises of Christophe
he solicited John II. king of Portugal, to
with the means of undertaking a great e
the south-west. This application also
cessful, Behem embarked, and discovered
the coast of America now called Brazil,
cing still more to the southward, reache
of Magellan, or the country of some sa
whom he called Patagonians. He is said
stowed that appellation upon them, from t
ties of their bodies being covered with s
greater resemblance to the paws of a bear
man hands and feet. James Canus, a
was associated with Behem in this sec
which having occupied above two years,
tors returned to Portugal after losing m
men.

If these facts be undoubted, we ough
the discovery of the American contine
Straits of Magellan to Martin Behem, ins
lumbus and Magellan. The first did n
1492, and the second not before 1519,
after Behem's expedition.

As a reward for the discoveries made

s knighted by his patron the king of Portugal;
an interesting account of the ceremony on the
on, we are told that the Duke of Begia put on
ght spur, the count Christopher de Mela his
his iron helmet was put on by the count Mar-
abarinis; and the king himself girded on his
. This dignity, however, some have supposed,
onferred for the discovery of the kingdom of
in Africa, because the gold and precious arti-
arried from thence to Portugal would make a
greater impression, than merely ascertaining the
ice of another continent.

he year 1492, Behem undertook a journey to
ive city Nuremberg. While residing there, he
ucted a remarkable terrestrial globe yet in pre-
ion, from the writings of Ptolemy, Strabo, and
of the ancients, and from the accounts of Mar-
lo and Sir John Mandeville, travellers of the
nth and fourteenth centuries. The track of
avigator's own discoveries is also laid down,
plainly exhibits, that the western lands mark-
the globe, mean the coast of Brazil and straits
gellan.

er having performed several other interesting
es, Behem died at Lisbon, in July 1506.

cannot disguise, that there are historians who
reated the discoveries, ascribed to this navigator,
nany fictions of the Germans, arising from their
of claiming the first voyages to the new conti-
Yet it is acknowledged, even by those who
eenly controvert the point, that Behem effect-
ttlement in Fayal; that he was the intimate
of Columbus; that he framed a chart of the
efore unknown; and that Magellan possessed a
constructed by him. All the disputed facts
ly discussed in a memoir by M. Otto, to which
all refer. *American Philosophical Transac-*
vol. ii. p. 263. (*c*)

HUT, or Betuh, the *Hydaspes* of the an-
is a large river of Hindostan, which issues
he spring of Wair in Cashmere, and runs into
hunaub, about fifty miles above Moultan. See
tson's *Disquisition on India*, p. 18; and Ren-
Memoir, p. 99. (*j*)

JARIA, a genus of plants of the class Do-
dria, and order Monogynia. See Botany. (*w*)

ING. See Metaphysics.

IRA, a province of Portugal, divided into the
and the lower Beira. It is bounded on the north,
river Douro, which separates it from the pro-
of Entre Douro a Minho, and Tralos Montes.
cean and part of Estremadura limit it on the
the Tagus and another part of Estremadura
t on the south; and it is enclosed on the east
kingdom of Leon and Spanish Estremadura.
large and fertile province is about thirty-four
long and as many broad, and contains the cities
owns of Coimbra, Lamego, Guarda, Viseu,
da do Corvo, Aveiro or Nova Braganza, Ten-
Ovar, Pinhel, Almeida, Francoso, Meda, Cas-
Branco, Penamacor, and Covilhaa. The river
lego, which traverses the greater part of the
ce, runs into the sea near the southern extre-
and adorns in its course many beautiful and fer-
lleys. The narrow and rich vale of the Mondego, in the neighbourhood of Coimbra, is reckoned one of the most enchanting spots of Portugal, and has been celebrated in the immortal strains of Camoens.

> "In sweet Mondego's ever verdant bowers,"

lies the scene of the interesting and tragical story of Inez de Castro.

The country round Coimbra is remarkable for its beauty and its cultivation. The mountains are covered with pines, and even German oaks. They consist partly of a coarse grained sandstone, alternating with a grey limestone. High schistus mountains began at a distance. A yellowish grey argillaceous slate changes to a sand slate, which is succeeded by mica slate, terminating in granite. The plants in this part are remarkably beautiful, the land is well cultivated, and oil is produced in great abundance. The olive tree abounds so much, that the traveller may wander for whole days without observing any other tree. The olives are ripe in December and January. They are beaten from the trees by means of long poles. The oil presses are wrought by oxen; but the oil is much deteriorated by want of cleanliness in the process. The ripe brown olives are the only ones that are pickled by the Portuguese.

Various kinds of wheat grow round Coimbra; but the summer wheat only succeeds, when the inundations of the Mondego have rotted the seed in the ground. Barley and a little rye are also sown; and rice grows in the marshes along the Mondego. Indian corn is produced in much larger quantities throughout Beira, than in the southern provinces, where the soil is too light and dry. The oranges of this province are excellent, and are exported to other countries. Coal is found along the coast, from Buarcos to Figueira; but in 1779 this valuable mineral had not been worked.

Mountains of argillaceous schistus begin near Sobral, not far from Ovar; mica slate soon succeeds it, and introduces a lofty ridge of steep mountains crowded upon one another, and extending along the southern banks of the Douro, even farther than Lamego.

This province is divided into seven corregidors and two oydors, viz.

	Population.
Corregidor of Coimbra, ...	150,000
Town of Coimbra, ...	12,000
Corregidor of Viseu, ...	95,000
Corregidor of Lamego, ...	60,000
Corregidor of Pinhel, ...	70,000
Corregidor of Guarda, ...	7,000
Town of Guarda, ...	1,000
Corregidor of Castello Branco, ...	40,000
Town of Castello Branco, ...	4,000
Oyder of Montemor-o-Velho, ...	3,000
Oyder of Mon-feira, ...	40,000
Town of Mon-feira, ...	4,000

The whole population of Beira amounts to 560,000. (q)

BEIT el Fakih, or *The Dwelling of the Sage*, is a city of Arabia, in the province of Yemen, situated in a well cultivated plain, about 24 miles from the Arabian Gulf. The tomb of Ahmed iba Musa, situated on a sandy hill near the town, attracted the inhabitants of Ghalefka, when their harbour was choked up with sand, to settle in the vicinity of that consecrated spot. As the new city increased in magnitude, a citadel was built for its protection. The town is composed of a number of houses, or rather huts, detached from one another; and after it was burned down in 1765, many edifices of stone were erected. The mode of building is constantly improving; yet a great many of the houses are built with mud mixed with dung, and the roof is thatched with a kind of grass common in the country. These houses are not divided into separate apartments. A range of straw beds surrounds the apartment; and it is not often that they have any windows. A species of ant, called *ard* by the Arabs, infest the houses to a very great degree. By forming covert ways, they introduce themselves into the houses, and destroy both clothes and provisions. The trees in the garden suffer also from their depredations; and even when their cells and passages are destroyed, they repair them with astonishing celerity.

"This city," says Niebuhr, "is in a favourable situation for trade, being only half a day's journey from the hills on which the coffee grows, and but a few day's journey from the harbours of Loheia, Hodeida, and Mocha, from which this commodity is exported; it naturally becomes the most considerable market for it. This trade brings hither merchants from Egypt, Syria, Barbary, Persia, Habbesch, India, and often from Europe." A dola, who resides in this town, has an extensive jurisdiction over the surrounding country. According to Lord Valentia's chart of the Red Sea, Beit el Fakih is situated in East Long. 43° 23′ 40″, and North Lat. 14° 32′ 10″. See Niebuhr's *Travels*, Sect. viii. chap vi. (Q)

BEKAA, the name of a fertile valley in Syria, which lies between the mountains of Antelibanus and Libanus. The earthquake of 1759, destroyed the thriving villages and plantations of the Moloualis; and the subsequent cruelties of the Turks completed the desolation of this charming valley. (*j*)

BEKIA, BEKOUYA, BEQUIA, or BOQUIO, called by the French *Little Martinico*, is the smallest of the Grenadilles islands in the West Indies. It is about 36 miles in circuit, contains 3700 acres, and produces wild cotton and water melons. The inhabitants of Grenada and St Vincent's resort to it for the purpose of catching turtles. It is 32 miles north-east of Grenada. West Long. 61° 22′, North Lat. 12° 37′. (*j*)

BELEM, a town of Portugal, in the vicinity of Lisbon, and province of Estremadura, is situated on the north bank of the Tagus, and is remarkable for its monastery and royal palace, and as the burial place of many of the Portuguese kings and princes. A little below Belem is a square tower, defended by cannon, along with several batteries, and a small irregular fort. The magnificent church of Belem sunk in 1756. Mr Link observes, that this town, which partly stands on a basalt hill, suffered less from the earthquake of 1755, than some parts of the town evidently founded on limestone. Hence he suggests, that the basalt had, at some former period, been forced up from these parts by a similar convulsion; and
that the shocks which Lisbon has occasionall
are attempts of nature to raise similar hills.

The monastery which we have mentioned,
of Hieronymites, the architecture of which i
striking, the greatest pains having been taken to
every appearance of regularity and order. T
jacent church is in a grand stile of Gothic ar
ture; and there are also in Belem two handsome c
es, which have been recently erected. Near
these churches is the botanic garden; and the
garden is a little farther on. Belem is a consid
market town, and is inhabited by many pers
property, and by tradesmen of the highest class
royal family formerly had their residence her
after the castle was burnt, they removed to
lus. (Q)

BELEMNITE. See ORYCTOGNOSY.

BELFAST, a large flourishing town of I
in the county of Antrim, and capital of the pr
of Ulster, situated at the mouth of the river I
which separates it from the county of Down.
lower part of the town is not elevated more t
feet above high water mark at spring tides. I
lough, or the bay of Carrickfergus, which r
the river Lagan, is a spacious estuary, containing
ty-four square miles, a great part of which is l
every tide, which is the case likewise with Stra
lough, another great estuary, the nearest extren
which is eight miles S. E.

Between Belfast and Lough Neagh, which is
twelve miles west of it, there is a chain of mou
the highest of which, called Devis, is about
feet high. These mountains extend to the neig
hood of the town, and are mostly covered with
Some of them, however, consist of very good
to their summits, interspersed with veins of lime
About three miles north of the town stands the
Hill, so called from a number of caves in it f
out of the solid rock, the largest of which is
thirty-two feet wide, and thirty-six long; th
shelters the bay on the west, and being con
with the delightful plantations and elegant co
seats which extend almost from its base to the
exhibits a most beautiful and picturesque view.
town is more ancient than is generally supposed
parish is a vicarage, called *Shankil*, or the old c
There was formerly a castle at Belfast, the ru
which are still to be seen. Its date is unknown
it is said to be very ancient, and seems to have
post of some importance, as it was twice taken a
stroyed by the Earl of Kildare, lord deputy, in
and 1512. It was inhabited before Queen Eliza
time, by Randolphus Lane, and granted by her,
a vast tract of adjoining lands, to the family of S
who forfeited their title in the reign of James I

About the beginning of the seventeenth ce
after the complete reduction of Ireland, Belfa
came the property of Sir Arthur Chichester,
wards lord deputy and baron of Belfast, who e
himself in the settlement of Ulster, and in wh
mily it still remains. Through his influence i
made a borough in 1613, and sent two memb
the Irish Parliament, and under the act of
returns one member to the Imperial legis
An English gentleman, who travelled throug

and in 1635, and whose journal is in the on of General Vallancey, mentions, that Lord ster had a stately palace at Belfast, which e glory and beauty of the town, and which chief residence. Through the interest of bleman, also, the custom-house was removed arrickfergus to Belfast by the Earl of Staf- 1638, for which a compensation of £2000 id to the corporation of Carrickfergus. In Belfast was taken possession of by Colonel ards the famous General) Monk, for the ent of England; yet, so late as 1726, it to have been a small place of little conse- But situated in the centre of two populous, ous, and intelligent counties, it is now become the most interesting objects in Ireland to the l economist. Its inhabitants are celebrated for spitality, taste, and public spirit; and its mer- have extended their commerce to every part of ling world, except where exclusive privileges to ed bodies mark the bounds of their extension. town is well built, mostly of brick, and the are broad, straight, and well lighted. The over the Lagan is about 2560 feet long, with one arches, eighteen of which are in Down, ee in Antrim; the channel dividing the two s running under the third arch. It was built he time of the Revolution at the joint expense counties, and cost £12,000. With regard Belfast is generally reckoned the fourth, and spect to commerce it is the third, town in Ire- eing next to Dublin and Cork. Vessels of ns, half loaded, used to come up to the quay, eing about ten feet water at spring tides; but e water is from nine to thirteen feet deep, ac- to the time of the moon, having been deepen- he exertions of the ballast corporation. Con- docks have also been lately erected for build- l repairing vessels. Those vessels that cannot o the quays, lie at *Carmoil* pool, (the place of f fish,) about three miles from the town, where secure anchorage for large ships. The West and American trade, before the late restric- n commerce, was very considerable. Their xports are linen, butter, beef, pork, oatmeal, he value of Irish goods exported from Belfast the year 1809 amounted to £1,910,909, 5s., ch linen formed the greatest part. In 1775, ss customs amounted, according to Mr Young, £64,800, including the excise on tobacco eign spirits; but ever since it has gradually ed, except during the year 1798, and in the ding the 10th October 1809, amounted to 439, 16s. 11½d. The excise of Belfast in 1796 9097, 13s. 2½d.; but previous to the stop- n distilleries, it had risen to £22,165, 3s. 6d., ve of Carrickfergus and Templepatrick, which are included in the same district. The duty nces, in 1801, amounted to £4309. Though rease, as in other places, must be partly attri- to the increase of duties, yet the extent of must also have been considerable. The popu- n 1782 was about 13,105: At present (1810), timated at 30,000 including Ballymacarret, the s on the Down side of the Lagan. There were, 1, 695 looms, the greatest part of which were employed in the linen and cotton manufacture. There are also manufactories of glass, sugar, earthen ware, &c. The public buildings are not many. The white linen hall is large and commodious; and the exchange, over which there is a good assembly room, is a handsome building, situated near the middle of the town. The foundation was laid in 1769: It was erected at the expence of the late Marquis of Donegall, and cost £4000. There is a barrack, healthfully situated, which contains about 800 men; and near it has been lately erected an artillery barrack. The houses of public worship are ten; an established church in Donegall street, a handsome structure, but rather small for the parish; six dissenting meeting-houses, four of which are presbyterian; a quaker meeting-house; a methodist meeting-house; and a Roman catholic chapel. There are many charitable institutions; the principal of which is called *The Belfast Incorporate Charitable Society*, or poor-house and infirmary, which was built by subscription and lotteries. The foundation was laid in 1771: It cost about £7000, and was incorporated by act of Parliament in 1774. It is a large commodious building, healthfully situated, in which about 300 of various ages are maintained and clothed, and the young educated. There are also a lying-in hospital, a fever hospital, a dispensary, a charity school for boarding girls, a day school for boys and girls, a Sunday school of great utility, and a school of industry for the blind; none of them very extensive, but sufficiently so for such an industrious country. In the beginning of 1809, a house of industry was established, similar to the Hamburgh plan described by Mr Voght, for the purpose of abolishing mendicity, and assisting the industrious poor, which promises to be of incalculable benefit to the town. In such a place as Belfast, many commercial institutions might be expected; and, accordingly, we find a chamber of commerce, a ballast office corporation, two insurance offices, a police committee, &c. &c. There is also a book society called *The Belfast Society for promoting Knowledge*, which possesses about 2000 volumes, a cabinet of minerals, and several philosophical instruments. There is another book society, under the title of *The Belfast Society for acquiring Knowledge*, nearly as extensive as the former. A *Literary Society* has also been lately established, whose chief object is polite literature, science, and antiquities, *fasciculi* of which are occasionally published. There are a great many other societies similar to the above, but they are too numerous to be mentioned. An academy, for the education of the higher class in this town, was founded by the inhabitants in 1786, and has been hitherto under the directions of a presbyterian minister; but the advantages of it are not confined to any sect. In 1807, another academy was opened, which is under the direction, also, of one of the presbyterian ministers, and is well attended. The private schools are innumerable. But that which most entitles the inhabitants of Belfast to the gratitude of their countrymen is the *Academical Institution*, or *New College*, the foundation stone of which was laid on the of July 1810. A subscription was opened in 1808, for the purpose of establishing a college on the following extensive plan: Large schools are to be built and endowed for educating boys for every department of life; and professorships are

[illegible]

... which they receive from Upper Hungary and Sclavonia. The duty annually levied upon goods amounts to 400,000 livres. The surrounding country, which is very poorly cultivated, produces fine oaks, and is marked with several small villages inhabited by Rascians.

The situation of Belgrade, as the key of Hungary, has frequently rendered it the object of fierce contention between the Austrians and the Turks. In 1436, Belgrade was besieged by Amurath; but the garrison of 10,000 by which it was defended, compelled the Turkish army to retire. Solyman the Magnificent made himself master of it in 1521; but it was recovered in 1688 by the imperial army under the Elector of Bavaria. The cruelties of the governor to the captain of the Greek interpreter, whom the Elector had charged with the summons for a surrender, inspired the besiegers with a thirst for vengeance, which was most wantonly gratified in the murder of the defenceless inhabitants. The Turks again laid siege to it in 1690; and, in consequence of a bomb having lighted upon the great tower, by which the walls of the city were thrown down, and 1200 of the garrison destroyed, the Austrians were compelled to resign the city to the fury and cruelties of the besiegers. The Austrians, in 1693, attempted to regain possession of this important place; but after many fruitless attempts, and the loss of 1000 men, they were under the necessity of raising the siege. The possession of Belgrade was confirmed to the Turks by the treaty of Carlowitz in 1699, and they remained masters of it till the year 1717, when it underwent one of the most celebrated sieges that history has to record.

Under the pretence that the Venetians had infringed the treaty of Carlowitz, the Turks declared war against Austria in 1715. In May 1717, Prince Eugene marched to the siege of Belgrade with a fine army of about 90,000 men. On the 15th of June, he effected the passage of the Danube in boats, and Belgrade was completely invested on the 19th of that month. The Turkish garrison amounted to about 25,000 men, and were assisted by a strong flotilla on the Danube. The besiegers were harassed by a violent storm on the 13th of July, which broke down their bridges over the Danube and the Save, and by several bold sorties, in which the Turks displayed the most undaunted courage; but a complete chain of works having been constructed, the Austrians were completely secured against the efforts both of the garrison and the elements.

The Austrian batteries were opened with tremendous effect on the 23d of July. The part of the town near the river was a heap of ruins; and nothing but the hopes of succour, and confidence in the strength of their fortifications, could have prevented the garrison from yieldiug to the enemy. On the 31st of July, a Turkish army of 200,000 men, under the Grand Vizier, arrived at Belgrade, and encamped above the Austrian camp, having its left towards the Save, and its right supported by the Danube. The works which the Grand Vizier threw up, were mounted with 140 pieces of cannon. Being thus placed between the fire of the Ottoman army and that of the garrison, while his army was wasting with the dysentery, and a mortality prevailing among the horses, [illegible] as his generous intercessor [illegible] recommending her as worthy of his most [illegible] he threw himself at the feet of [illegible] bed, acknowledged her [illegible] and vowed to conduct [illegible] the most submissive of her servants. [illegible] rank and possessions, [illegible] the Goths in Italy, [illegible] formidable than ever, [illegible] Totila. Though [illegible] with the scene of action [illegible] with greater skill, [illegible] expedition [illegible] country; yet [illegible] against the enemy, and [illegible] to his military fame. His [illegible] be attributed to the [illegible] reinforcements, with which he was [illegible] the effects of his recent disgrace, [illegible] rendered him more [illegible] in his measures, [illegible] more distrustful of his [illegible] influence of Antonina, he procured [illegible] return to Constantinople, where, [illegible] afterwards, his military talents were [illegible] of a sudden [illegible] of the [illegible] who had rapidly advanced to the walls of [illegible] Though weakened by age, and [illegible] a shield, the veteran general [illegible] demand for his services, put himself at [illegible] of a tumultuary band, arrested the progress [illegible] enemy, and delivered the metropolis from [illegible] This was the last exploit of Belisarius: and [illegible] more gratefully requited than any of the [illegible] Through the increasing [illegible] of the [illegible] he was suspected of a conspiracy, hastily [illegible], and put under a guard of soldiers in his [illegible]. His innocence, indeed, was speedily acknowledged, his freedom, possessions, and honours restored; but, within a few months after this acquittal, his misfortunes were terminated by death in the year 565. That he was deprived of his sight, and reduced to beg his bread in the streets of Constantinople, is a fiction of later times, which originated in a poem of John Tzetzes, a monk, who wrote in the [illegible] century. Making every allowance for the partialities of Procopius, who was the witness and historian of many of the actions of Belisarius, he must be admitted to have been one of the greatest commanders who had appeared in the Roman empire for many years. He was prudent without fear, bold without rashness, and remarkably fertile in expedients; liberal to his soldiers, humanely attentive to their comfort when sick or wounded, and, at the same time, careful to preserve them under the most rigid discipline. During the march of his armies, the husbandmen enjoyed the utmost peace and protection; so that not an apple was gathered from a tree, nor was a path to be traced in the fields of corn. He was equally careful to preserve the vanquished from the fury of his troops, in the moment of victory; and when they entered the city of Naples by assault, he was seen standing in the streets, repeatedly exclaiming to his soldiers, "the gold and silver are the just rewards of your valour; but spare the inhabitants: they are Christians; they are supplicants; they are now your fellow subjects." He was humble in [illegible]

y; and so exemplary for temperance in his per-
conduct, that, amidst all his successes, and with
e licence of a military life, he was never intoxi-
l with wine, nor suspected of unchastity. See
on's *Hist. of the Rom. Empire*, vol. iv. 4to,
7, 182.; *Ancient Un. Hist.* vol. xvi. and xix.;
Un. Hist. vol. xiv.; and Denina, *Delle Revolu-
d'Italia.* (*q*)

ELL. If any definition be required of what is
ll known, and in such general use as a bell, it
be "an inverted vase, which, struck with a clap-
is employed singly as a signal, and when com-
, either in churches or as a musical instrument."
e size, weight, and figure of bells are arbitrary;
large bell is usually one-fifteenth of its diame-
thickness, and twelve times its thickness in
t. The shape of bells is different in different
ries, being more cylindrical or conical in one
in another; and having evidently originated in
als or basons, it is probable that from remote
to the present times, there may have been a gra-
progression from a flat circular plate to a figure
approaching a cylinder. The gravity and
ness of tone are, perhaps, regulated by the same
tions affecting the sound of tubular wind instru-
; for we know that the greater the capacity, the
r or more grave is the sound. Thus we learn,
a bell of large dimensions in Moscow yields
nd and solemn tone; and when rung, a deep,
w murmur, resembling the lowest notes of a vast
, or the rolling of distant thunder, vibrates all
he city.

e substance of which bells are made, likewise,
ces a difference in the tone. Glass is one of the
sonorous bodies, and is formed into bells, though
l pulsationem; we have heard also of wooden
n the East; but throughout Europe they are
ably made of a compound of copper and tin,
bell metal; to which silver is occasionally
. All metals are more or less sonorous accord-
figure; even lead, which in most forms is
rings loudly in the segment of a sphere: and
ourable is this shape to sound, that it is main-
, had our ancestors been acquainted with the
all our bells, instead of being hollow vases in-
, would have been so many segments of metallic
s. The vibration of every metallic plate is ana-
to that of a bell, and if sufficiently ductile,
e moulded into one by simple pressure: thus
nperceptible transition from cymbals to bells
nce evident, and easily accounts for that va-
f form to be seen in different countries.

th regard to the tone produced by one kind of
compared with another, Mersenne, a very in-
nt author on the subject, affirms it to be as
s:

etals.	Weight in Air.	Weight in Water.	Sound.
. . . .	2 oz. 28½ grains	1¾ oz. 1 sc. 4 gr.	194
th . . .	1¼ oz. 34 gr.	1 oz. 1 sc. 31 gr.	213
on Tin	1¼ oz. 25½ gr.	1 oz. 1 sc. 6 gr.	253
Silver .	1¼ oz. 31 gr.	1 oz. 2 sc. 31 gr.	256
Tin . .	1 oz. 1½ sc. 30 gr.	1 oz. 1½ sc. 6 gr.	263

Metals.	Weight in Air.	Weight in Water.	Sound.
Common Silver	1½ oz. 1 sc. 24 gr.	1⅓ oz.	266
Bell Metal . .	1¼ oz. 1 sc. 1 gr.	1 oz. 1½ sc. 4 gr.	269
Regulus Stibii	1 oz.	½ oz. 3 sc.	270
Pure Copper	1 oz. 6 sc. 45 gr.	1 oz. 41 gr.	282
Mixed Copper	1¼ oz. ½ sc. 17 gr.	1 oz. ½ sc. 4 gr.	285
Brass	¾ oz. ½ sc. 9½ gr.	1½ oz. 70 gr.	294
Common Gold	2 oz. 27½ gr.	1 oz. 7 sc. 50¾ gr.	294

The figure of the bells with which this experiment was made, approached to that of a large hollow segment of a sphere, being sixteen lines of internal and fifteen lines of external diameter; and being one line and a quarter thick in the lip. Each bell resembled another as much as possibly could be effected in the fabrication, and their specific gravity also afforded an approximation towards more accurate results. The figures represent the tones, the greater number being the more acute, and the smaller the more grave. Thus it appears, that lead is the most grave, and that brass and gold produce an equal tone or unison. Expressing this in musical notes, the tone of a brazen or golden bell forms the sharp seventh above that of a leaden one. It is not evident that the Europeans are acquainted with the most sonorous composition for bells: one known by the Chinese, which we find in their gongs, infinitely surpasses it. The same nation has musical instruments composed of metallic plates extremely sonorous. In ancient history we read, that Charlemagne, while expressing his admiration of the tone of a bell made by an eminent artist, was addressed by the artist himself, soliciting a quantity of pure copper, and requesting that, instead of tin, he should be provided with at least an hundred weight of silver: With these materials, he engaged to cast such a bell, that the one which the emperor admired should seem mute in comparison with the other.

Bells, both ancient and modern, have been applied to purposes sacred, superstitious, or profane. They are undoubtedly of very great antiquity, being frequently mentioned in sacred writ; and, in particular, Moses ordained the under part of the blue tunic of the high priest, worn at religious ceremonies, to be adorned with pomegranates and gold bells intermixed. Commentators suppose that it was for the purpose of announcing his presence, or that he was entering the sanctuary. Nevertheless, there is much controversy concerning the bells, or *tintinnabuli*, of old; and many are induced to suppose, that in general cymbals should be understood. Neither is it agreed what are the names by which the ancients signify bells: but by both ancients and moderns, it appears that they were called Tintinnabulum, Petasus, Codon, Nola, Lebes, Æs, Æramentum, Squilla, Crotalum, Signum, Cloca, Campana. All these received their names, either from the place where they were invented, or from their shape, or properties; and it seems generally admitted, that *tintinnabulum*, among the ancients, signifies a bell similar to those we now use; while *campana* is a name belonging to the middle ages.

The Greeks were acquainted with bells: At Athens the priest of Proserpine rung a bell to call the people to sacrifice; and those who went the nightly rounds in camps, rung a little bell at the post of each centinel, to keep him awake. We learn from Strabo also, that in the Greek islands a bell was used to announce the sale of provisions. By the Romans, bells were employed for various purposes, and those somewhat similar to our own. They warned the citizens of Rome that the baths, which there were great and splendid edifices, were ready for use: as, according to the regulations, they were open only at certain hours. Thus Martial, in signifying that a hand-bell might be an acceptable present, composes these verses in lieu of it.

TINTINNABULUM

Redde Pilam: *sonat æs thermarum:* ludere pergis?
Virgine vis sola lotus abire domum.

APOPHORETA, 163.

They were hung at the gates of temples, as we learn from Suetonius in the life of Augustus, *Cum dedicatam in Capitolio ædem Tonanti Jovi assidue frequentaret, somniavit queri Capitolinum Jovem cultores sibi abduci seque respondisse Tonantem pro janitore ei appositum: ideoque mox tintinnabulis fastigium ædis redimivit quod ea fere januis dependebant:* and Dio, speaking of the same fact, says, *Augustus orto die tintinnabulum Jovi Tonanti appendit: his enim tintinnabulis Bannitores nocturni utuntur, ut si quid usus sit significare possint.* They were used in the houses of the great, and also in the superstitions of the people.

It is uncertain when bells were first introduced into the Christian church for sacred purposes, or for congregating the flock to divine worship. The signal for the hour of performing the latter was in the Eastern churches anciently made by a rattle, or beating on wooden boards with a hammer, which was long retained. Jacobus de Vitriaco, alluding to the Greek church, proceeds, *unde cum omnes alii orientales prælati exceptis, duntaxat, Latinis annulis et mitris pontificalibus non utantur: nec baculos pastoralos gestant in manibus nec usum habeant campanarum, sed percussis baculo vel malleo tabulis, populum ad ecclesiam soliti sunt congregare.* Bells, however, were used in the Greek church in 874, if not earlier, and are reported to have been introduced from Venice. Congregations might therefore be assembled by other means than the sound of bells; and we know that at present, the hour of prayer, among the Mahometans, who many times exceed the Christians in number, is announced by a person from the top of a tower. Flodoardus remarks, respecting the use of trumpets in warning the devout,

Ære tubas fuso attollit quibus agmine plebis
Admoneat laudes et vota referre Tonanti.

An old author likewise tells us, that the signal for divine worship was given by trumpets, *signa quæ nunc per campanas dantur, olim per tubas dabantur.* And he gives the following etymology of the word, which we observe is not to be found among the classics: *Hæc vasa primum in* NOLA *Campaniæ sunt repertæ unde sic dicta: Majora quippe vasa dicuntur campanæ a Campaniæ regione: minores nolæ a civitate Nola Campaniæ.* Innocentus Ansaldus is of opinion, that all signals of hours were anciently given by trumpets, and that it was scarcely before the sixth century that bells were used in churches.

The period of introducing bells into the churches of England is not completely ascertained. Bede, in alluding to the year 680, or near that time, says, *audivit subito in aëre notum campanæ sonum quo ad orationes excitari vel convocari solebant.* After that they probably became common, and were the subject of pious donations, both here and on the continent. Turketulus, abbot of Croyland, who died in 975, caused a very large bell to be made, and presented it to his abbey. It was called Guthlac. His successor Egelricus also caused two large bells, called Bartholomæus and Bettelmus, be made, two of middle size called Turketulus and Tatwinus, and two smaller called Pega and Bega. When the bell Guthlac was rung along with these, Ingulphus affirms that such wonderful harmony was produced, that there was no ringing in all England to be compared to it.

Thus we see, that bells bore certain names, which has led to an animated controversy, whether they were baptized or not. Considering the extravagant ceremonies, and superstitions of the Roman Catholic faith, we apprehend that something very similar to baptism may have been anciently used, more especially as we find an express injunction against it. Yet those who have entered most keenly into the dispute, deem it little less than sacrilege, that baptism, which, in its pure acceptation, is a sacrament of remission from original sin, should be bestowed on inanimate substances. The ceremony used, if not baptism in the strict sense, was undoubtedly consecration, or benediction, and at the same time a name was given. The bishop performing the consecration made five crosses, pronouncing these words, *sanctificetur et consecretur Domine, signum istud, in nomine patris filii et spiritus sanctus. In honorem sancti N. Pax Tibi.* By this formula the bell was consecrated in honour of a certain saint; but some of the chronicles go further, and compare the ceremony to actual baptism—*Signa quinque: unum ex his mirabile in quo duo millenaria metallæ et sexcentæ libræ fuerunt cui imprimi jussit signum baptismi de oleo et chrismate facti: Sicut ordo deposcit ecclesiasticus et ut vocaretur Robertus attribuerit spiritus sanctus.* In the *Chronicon Montis Sereni* it is said, that a bishop Humbert consecrated a bell of fifty hundred weight, calling it Petronilla. Pope John XIII, in 968, consecrated a new bell of great size in the Lateran, and gave it the name of John. All the more remarkable bells were named, or had legends inscribed on them; thus on one of two old bells in England, there is to be read:

Hæc nova campana Margaretta est nominata;

and on the other, in the same place,

In multis annis resonet campana Johannis.

Such inscriptions were often in honour of some saint, as if to remind the people of a sanctified name when the bell was rung, or to render the saint propitious to the donor and the flock. They expressed the weight and quality of the bell, or the properties which it possessed, and this sometimes led to the elucidation of historical facts: In a tower of St Peter's at Rome were five bells, most of which were explanatory of some fact, and inscribed with several

Latin verses; one was hung in 1258, during the ministry of a certain person; another was cast in 1353, after the lightning had destroyed former bells in the preceding year. Bells frequently bear the date, and an apposite legend. In the church of the Jesuits at Rome, there was one brought from England, which was inscribed *Facta fuit A. Dom.* 1400, *die vi. mensis Septembris; Sancta Barbara ora pro nobis*. Five bells being cast for a parish church in England, each had an inscription in Latin hexameters, expressing its name, or that it was to be rung in memory of those individuals whose names were recorded on them.

In regard to the superstitious uses of bells, we shall probably find the ringing of them at funerals to have originated in the darkest ages, but with a different view from that in which they are now employed. It has been supposed, and we believe with some justice, that the most ancient bells or cymbals, were made of brass. A certain virtue was conceived to reside in that metal: the knives used in sacrifices were made of it: it entered the composition of the sacred utensils in the temples; the sound of it put demons to flight, and witches used it in their incantations.

> *Omnia trita simul quæ sanguine mista recenti*
> *Coxerat* ære cavo *viridi versata cicuta.* OVID Met. IV.

Reasoning from the customs of the ancients, that have been transmitted to us in innumerable superstitions, which extensive analogies only enable us to recognise, we may partly connect the ringing of bells for persons in the agonies of death, with the virtue supposed to reside in the sound of brass. It was to avert the influence of demons. But if the superstitions of our ancestors did not originate in this imaginary virtue, while they preserved the practice, it is certain that they believed the mere noise had the same effect; and as, according to their ideas, evil spirits were always hovering around to make a prey of departing souls, the tolling of bells struck them with terror.

We may trace the practice of tolling bells during funerals to the like source. This has been practised from times of great antiquity; the bells being muffled for the sake of greater solemnity, in the same way as we see drums muffled in military funerals. Possibly it was also with the view of averting the influence of evil spirits, as the soul was not believed to pass immediately to the regions of light or darkness. The efficacy of bells, and of other noises, in putting demons to flight, is recorded among the ancients; and from them was widely extended, during the more barbarous ages. An eclipse of the moon, was supposed to be the oppression of evil spirits, and the intelligent Pliny observes, *Viri ingentes, inter quos fuit Stesichorus et Pindarus, crediderunt lunam eclipsin et quasi mortem pati ex cantationibus unde et id luna pateretur dissono crepitu succurrebant*: and the ringing of bells during eclipses, is particularly spoken of by Juvenal:

> ——— *Verborum tanta cadit vis*
> *Tot pariter pelves, tot tintinnabula dicas*
> *Pulsari. Jam nemo tubas, nemo æra fatiget*
> *Una laboranti poterit succurrere lunæ.* Sat. vi.

In Italy, this custom was preserved at a much later date: for during great tempests, the women assembled, ringing bells, and beating cymbals, in the noise of which, the learned Moresin observes, they confided more than in the efficacy of fasting and prayer. On St John's day, the bells were violently rung, and other superstitions practised, to put devils to flight, and avert the effect of storms, which they raised in the air.

We are therefore entitled to conclude, that the ringing of bells for persons in the agonies of death, at funerals, and to dispel tempests, has originally had relation to one common object, the expulsion of demons. Here also we may seek the consecration, or exorcising of bells, practised in the Roman Catholic churches, and perhaps the cause of naming them after particular saints. In the councils of Cologne it is said, "let bells be blessed, as the trumpets of the church militant, by which the people are assembled to hear the word of God: the clergy to announce his mercy by day, and his truth in their nocturnal vigils: that by their sound, the faithful may be invited to prayers, and that the spirit of devotion in them may be increased. The fathers have also maintained, that demons affrighted by the sound of bells calling Christians to prayers, would flee away; and when they fled, the persons of the faithful would be secure: that the destruction of lightnings and whirlwinds would be averted, and the spirits of the storm defeated." All these things were promoted by consecration; and a credulous bishop narrates several miracles displayed by consecrated bells, which, without much difficulty, we can trace to natural causes. Durand, the author of the *Rituals of the Roman Church*, says, "for expiring persons, bells must be tolled, that people may put up their prayers; this must be done twice for a woman, and thrice for a man: for a clergyman as many times as he had orders: and at the conclusion, a peal of all the bells must be given to distinguish the quality of the person, for whom the people are to offer up their prayers." An analogous custom is still preserved in the north, of concluding the tolling of the bells, with nine knells for a man, six for a woman, and three for a child. When once fully introduced, it was made the subject of emolument and extortion, and those only who were rich enough to pay for it, enjoyed the benefit of the passing bell.

Innumerable absurd ceremonies were practised by the Roman Catholics in ringing bells. Each was to be rung for a certain purpose at a certain hour, and so long at a time: When the monks were to undergo discipline in their monasteries, a bell called corrigiuncula was rung as a signal for the commencement of self-flagellation. They were rung on particular festivals, and muffled or tied upon others. The ringing on Christmas, and in ushering in the new year, preserved among us, is a remnant of Popish superstitions. During three days of the holy week, they were to be tied up, and in their stead boards were to be beaten with an iron hammer. In the town of Newcastle, we have understood the bells are muffled on the 30th of January, though we know not whether in commemoration of the death of Charles I., or as a relic of the older ceremonies of the church. The number of bells was a kind of privilege; and privation of them a punishment. A cathedral church was entitled to seven, or five at the least; a collegiate church, to three of different sizes; and a parish church to as many, or at least two. None were to be rung in towers, until they received solemn benediction, and they were to bear no profane figure or inscription, but one in honour of the titular saint, a sacred image, or a pious legend. The city of Bordeaux was deprived of its bells on account of rebellion. When offered to be restored, the inhabitants refused them, from the satisfaction they had enjoyed in being free of the constant noise of bells. Whether these bells had been employed for sacred or profane purposes, we do not discover; but it is incredible how much of the ceremonies of the Roman Catholic religion depended on the ringing of bells, according to time and quantity.

Bells were anciently suspended from the neck of a criminal who underwent scourging, which has been construed into a warning, that people should avoid the ominous consequences of his crossing their way. We doubt if this interpretation be correct, and we should rather be inclined to consider it a signal of punishment, and a warning to the populace not to merit the like. There are towns in modern days where the bells toll during an execution, which may have originated in a warning to people to pray for forgiveness to a departing soul; but now it is chiefly to increase the solemnity of the scene.

Strabo relates, that the Troglodytes suspended bells from the necks of animals in their flocks, for the purpose of frightening away wild beasts. Some authors have supposed, that this was to disclose the places whither they had strayed: and also, that the sound of bells was pleasing to the animals themselves. The practice is continued to the present times, in bells being suspended over horses, or from mules, sheep, and goats; but we suspect that it also has originated from a superstitious custom, and that the sound of the bells was to restrain demons from injuring the animals. Kings and nobles, anciently, had the housings of their horses hung with silver bells. Zachary the prophet, speaks of the bells of horses.

As bells were of old the subject of pious donations, he who could give the greatest gift claimed the most merit, which has perhaps tended more than any thing else to the enormous size of several bells, of which we read in history. In addition to those large ones already named, may be mentioned, a bell presented by King Edward III. of England to St Stephen's Chapel, which, according to an inscription on it was 33,000 weight. Sallengre, or Swertzius, the commentator on Hieronymus Magius, tells us, that the largest bell in all France hung in St Mary's church, at Rouen, in a lofty tower. It bore an inscription in these words, which are always erroneously quoted:

Je suis nommeé George d'Amboise,
Qui plus que trente six mil poise;
Et si qui bien me poysera,
Quarante mil y trouvera.

This bell was presented to the church by George, Archbishop of Rouen, and the tower containing it was equally famous. A great scarcity of oil prevailing in the diocese, so that there was hardly enough
for Lent, the Archbishop permitted the inhabita
use butter, on each paying sixpence for the indulg
From the sum thus collected, the tower was buil
always thereafter was called the *Tour de la Be*
The great bell at Moscow, of which we have sp
and which hangs in the tower of St Ivan, is 40
inches in circumference, 16½ inches thick, and w
above 57 tons, or 114,000 pounds. The city of
kin, in China, is much celebrated for the size
bells. One of these, almost of a cylindrical fig
nearly 12 feet high, and 7½ in diameter: and the
said to be seven bells in Pekin, each weighing 12
pounds. Yet, contrary to what we are told o
Russian bell, the tone of these is reported to
very indifferent quality, partly in consequence
ing struck with a wooden clapper. Such bel
inconsiderable, compared with an immense o
Erfurth, in Germany, which was long suppose
largest bell in the world. We do not know if
still there. The clapper of this immense bell w
ed 1100 pounds, and was 12 feet long, and its s
when the wind was not adverse, was heard at
leagues distance. A great artist, named Ger
Wou de Campis, cast it in 1497, and the ex
was defrayed by a subscription raised among
great and wealthy, for the whole weighed 25
pounds. In correspondence with the ancient
it was dedicated to the Virgin Mary, and bore
gend: *Laude patronos cano gloriosa, fulgur a*
et demones malignos, sacra templis a populo
carmine pulso; which words are explanatory of
efficacy supposed to reside in the sound of bells.
sibly no larger bells than this at Erfurth, and
other at St Ivan's tower in Moscow, have ever
hung: for although there be one far exceeding
dimensions of either, and indeed of both unite
has not been suspended. We allude to the great
of Moscow, emphatically termed by Dr Ch
"a mountain of metal." The exact dimensio
the great bell are not ascertained, owing to the
lying buried in the earth; but measured two
above the ground. Its circumference is 67
4 inches. The perpendicular height is 21 fe
inches, the metal measures 23 inches in the thic
part, and the weight of the whole is 443,772 po
A large proportion of silver is said to have been
ployed in casting it; for while the metal was i
sion, the nobles and people threw in their plate
money as votive offerings: and it certainly has a w
shining appearance, according to authentic acco
unlike bell metal in general. There is a great
ture in one side, which was occasioned by water p
ed on it while hot. The building or scaffolding e
ed over the pit in which it was cast having taken
the metal heated, and the water employed in e
guishing the flames had that effect. The bell
was removed from the pit; therefore, what is c
monly related of the tower where it was hung ha
taken fire, and the beam suspending it being bu
whence it fell and was broke, is not true. At
sent the pit is covered with a trap door: and on
tival days, the bell is visited by peasants, with
much devotion as they would visit the shrine of a
telar saint. The Russians regard it with supe
tious veneration, insomuch, that they would not a

Depth of water on the rock.

in the direction of the stratification: the breadth of this reef is less than that of the main rock, and diminishes towards the western extremity. The greatest length of the rock seen at low water of spring tides is 2127 feet, and the greatest breadth is 230 feet. The reef, or south-west part, being on a level with low water of spring tides, is consequently, at high water, under the whole rise of the respective tide; while on the higher part, which is in general about four feet above low water-mark of spring tides, and consequently about twelve feet under water at the height of ordinary spring tides.

Tides.

The same laws are observable in the rise and fall of the tides at the Bell Rock, as on the opposite and most contiguous shores of Forfarshire. On the days of new and full moon, it is high water at the rock at 40 minutes past one o'clock. The ordinary rise of spring tides is about fifteen feet, and of neap tides nine feet; but so much depends upon the state of the weather, that the tides vary from one to three feet in the rise and fall both of spring and neap tides; so that at low water much less of the rock will appear at one time than at another; and instead of shewing itself at low water of neap tides, it is sometimes from one to three feet under the surface of the water. Westerly winds have always a tendency to raise the tides higher, while easterly winds have a contrary effect. In moderate weather, the course of the flood-tide is south-west, and of the ebb-tide north-east, with some little variation, according to the time of tide. Spring tides have a velocity of three miles an hour near the rock, and neap tides about a mile and a quarter.

It is not a little remarkable, that so small a rock should follow the same laws in influencing the current with the coast of a country. Upon the rock it is flood-tide two hours before the ebb ceases to run at the distance of half a mile; so that the flood-tide will have almost covered the rock, while vessels in the offing are striving with an ebb-tide. The same thing is observable in a greater or less degree, according to the velocity of the tide, along all coasts; and the mariner accordingly knows how to shun an adverse tide, and to seek one in his favour, by keeping nearer, or at a greater distance from the shore.

Fuci on the rock.

The lower parts of the rock are covered with fuci, chiefly of the larger sorts, as the great tangle, fucus digitalis, and the badderlocks, or hen ware; which last is found of the length of 18 feet, and must then be very aged, as plants of the first year's growth are but a few inches long; and in two years they are found to be only about 18 inches in length. The higher parts of the rock abound with smaller fuci; as F. mamillosus, and F. palmatus, the common dulse; F. alatus, and F. coccineus, are found on the older stalks of tangle; and F. subfuscus and confervoides occupy the smaller pools. In some places the rocks are rendered slippery with ulva compressa, and umbilicalis; and the higher parts are so thickly covered with conferva rupestris, as to resemble a sward of grass.

Animals.

The rock is covered with lepas balanoides, and some parts abound with the common limpet and muscle; actinia crassicornis, with star-fishes; asterias glacialis, and occulata, are common. Common crabs of a large size, and a few lobsters, are found. Seals frequent the rock at low water, and it then becomes the resort and resting place of cormorants, shags, and herring-gulls, which feed on the haddocks and codlings found around the rock.

When the building of the light-house was begun, there was not a muscle to be seen upon the rock; but in less than four years, the north-east part was completely covered with muscles of a small size. These appeared to have been propagated from a few deposited for a stock of bait for the workmen engaged at the building, who were in the practice of employing their leisure hours in fishing. It is, however, to be feared, that the muscles will very soon be extirpated by their natural enemy the white bucky, buccinum lapillus, which seems to be increasing "in proportion to the means of subsistence"; and is rapidly destroying the muscle, by perforating a very small hole with its proboscis, through which the substance of the muscle is sucked out, when the shell opens, and is washed away by the tide.

From the various depths of water, and the variety of the bottom, which alters as the distance of the rock and the soundings are increased, from a rocky bottom, to coral, rough sand, rough gravel, shell sand, fine sand, and mud, which is found in the course of the tide from the Tay. From the circumstance of this variety, the following kinds of fish are caught near the rock in great abundance, and of excellent quality. The red-ware cod, close to the rock; and at a greater distance, the common cod, ling, holibut, skate, thornback, plaise, turbot, gurnard, wolfe fish, phod. dog-fish or leacdy, coal-fish, whiting, haddock, flounder, sole, mackerel, and herring.

It is worthy of remark, that when the weather becomes very cold in spring and autumn, and when the sea is agitated much by the wind, the fish appear to leave the vicinity of the rock, and perhaps go into deeper water. Of this, ample proofs have been afforded by the lighthouse vessels riding off the rock at all seasons of the year.

The Bell Rock is exposed to the waves of the ocean in the directions of north-east, east, and south-east, without any land between it and the continent of Norway and Jutland; on the opposite points of the compass, it lies open to the shores of Berwick, Haddington, Fife, and Forfar. Relatively to the two last counties, it may be considered as holding a centrical situation in a capacious basin, with a depth of water increasing from the shore till within two miles of the rock, where the ultimate depth is 23 fathoms; and from thence to the rock the soundings gradually diminish. At low water of spring tides, and at the distance of 100 yards from the rock, in all directions, there are about three fathoms water. On the south-east side, in the direction of the inclination of the strata, the water deepens more suddenly to 35 fathoms; and as you stand out to sea, the soundings become less and less; and at the distance of 30 miles, the water is only 22 fathoms deep upon Marr's Bank, which appears to be a deposition formed by the joint-operation of the waters of the Forth and Tay, influenced by the great wave of tide which proceeds round the island.

From the gradual increase of the depth of water in all directions from the rock, it must satisfactorily appear that it has a sufficient base to support it for ages, against the impression of the sea. By an atten-

nsideration, however, of the form of the rock
water, and of the ground which surrounds it,
:r with the nature of the stone, and the pro-
ffects of the continued wash of the sea violent-
ited; it does not seem an overstrained hypo-
o imagine, that this rock, at a remote period,
much greater extent, and perhaps considerably
he level of the highest tide.

n the position of this rock with regard to the
requented firths of Forth and Tay, lying about
's from the nearest land, a distance too great
mariner to be benefited by land-marks on the
while the rock itself is only visible about two
efore low water of spring-tides, even to vessels
and is scarcely seen at all in neap-tides. The
ne rocks off Plymouth are at the same distance
nd as the Bell Rock; but previous to the erec-
the Edystone lighthouse, the highest, or
ock, was always seen above the surface of the
and to a certain extent formed a beacon of it-
:he day-time, which was not the case at the
ɔck. Under these circumstances, the Bell Rock
n justly considered the most dangerous reef of
pon the whole coast of Great Britain; and
ıve proved fatal to many missing ships, whose
st for ever remain unknown.

baneful effects of such an obstruction to na-
ı had been long and severely felt, not only by
ımercial interest of these firths, but in a great-
ss degree by all vessels navigating the North
the German Ocean. Not merely were ves-
. upon the rock itself, but far greater num-
re cast away upon the neighbouring shores in
uring to avoid it, or foundered at sea in con-
e of keeping out too long, from the terror of
hing the coast where such a sunk rock lay in
urse.

:hree great inlets for shipping in storms upon
coast of Great Britain are, the Thames, the
f Forth, and the Murray Firth. To these
resort, in storms, from the north, east, and
ıst; and in such cases the Firth of Forth lies
a peculiar manner as a place of safety. Of
dreadful and continued gale from south-east,
ccurred in the month of December 1799, af-
memorable and striking instance, when the
Yarmouth Roads were driven from their
;s, and all vessels in the German Ocean drift-
the coast of Scotland, a very great number
helter in this Firth. Many, however, were
l in endeavouring to seek safety in higher la-
and it has been reckoned that seventy ves-
e upon this occasion lost, with most of the
ıpon the east coast of Scotland; many of
ıight have been saved had not the fear of the
ck in a great measure induced them to avoid
the Firth of Forth.

ıo wonder that the erection of a lighthouse
e Bell Rock should have so much interested
lic mind, not as a local improvement only,
ne essentially calculated to improve the navi-
f the whole north seas, by opening the Firth
h as a general rendezvous for shipping in
storms. By such an erection, seen as a bea-
day, and exhibiting a light under night, this
ıgerous rock is rendered at once the place of departure which ships will hail from, and for which they will steer in making the coast.

By whom brought about.

On the completion of a work of so much enterprise and difficulty as the Bell Rock lighthouse, we most heartily congratulate the public, and willingly contribute our mite of praise to that Honourable Board the Commissioners for erecting lighthouses on the northern parts of Great Britain, whose improvements pervade the whole coast of Scotland. By them this measure was taken up and brought before Parliament in the year 1807. The foundation stone was laid on Sunday the 10th of July 1808, and the whole was finished within the year 1810. See the article LIGHTHOUSE. (s)

BELLARMIN, ROBERT, an Italian Jesuit, and the ablest of all the Roman Catholic controversialists, was born at Monte Pulciano, a town in Tuscany, in the year 1542. At the age of eighteen he entered into the order of the Jesuits; he was ordained priest at Ghent in 1569; and as he was nephew to Pope Marcellus II. he had the fairest prospects of ecclesiastical preferment. His talents, however, were a still stronger recommendation. In 1570, he was appointed professor of divinity in Louvain, where he acquired a very high degree of celebrity. After residing seven years in the Low Countries, he returned to Italy, and began to lecture on controversies in Rome. His lectures displayed such uncommon acuteness and ingenuity, that when Pope Sextus V. sent a legate to France, in 1590, he appointed Bellarmin to attend him, as the person best qualified to resolve any difficulties which might occur in the course of his mission. After an absence of ten months, he returned to Rome, and received from the friendship of three successive popes, various important commissions, till at length, in the year 1599, he was raised to the dignity of cardinal. Nothing could be more honourable to Bellarmin, than the manner in which this dignity was conferred. "We chose him," said his Holiness, (Clement VIII.) "because the church of God does not possess his equal for learning;" yet he felt or affected such reluctance to accept of it, that Clement was obliged to frighten him into compliance by the terror of an anathema. Three years after, he was elected archbishop of Capua; and had he not belonged to the order of Jesuits, he would probably have been exalted to St Peter's chair. But that intriguing set of men were already so powerful, and so eager for the monopoly of ecclesiastical dignities, that it had long been a maxim at the court of Rome, that no Jesuit should ever be made pope, lest every other order should be excluded from the hope of the papal dignity, and the power of the Jesuits should become altogether boundless. Bellarmin, if we may believe his own confession, was by no means ambitious of that exalted honour. For in a solemn vow made in the prospect of being advanced to the see of Rome, he expressly says, that he does not at all desire it, and prays to God that it may never happen. He resigned the archbishopric of Capua at the request of Paul V., who wished to have him near himself; and continued for sixteen years actively engaged in the business of the court of Rome. He left the Vatican in 1621, and retired to a house of his own order, where he died the same year on the 7th of September, at the age of 79. He was visited in his last illness

Bellarmin.

by Pope Gregory XV., his veneration for whom, as Christ's vicegerent upon earth, he expressed in the words of the centurion, "Lord, I am not worthy that thou shouldest come under my roof." On the day of his funeral, the populace, who revered him as a saint, crowded in such numbers about his body, in order to touch and kiss it, that it was necessary to keep them off by a military guard. His garments, and every thing which he had been accustomed to use, were distributed as most venerable relics. It was pretended, too, that he had been endowed with the spirit of prophecy, and possessed the power of working miracles. All these appeared natural preludes to his canonization; and nothing prevented the popes from admitting him into the calendar of saints, but the fear of giving offence to those princes whose temporal rights he had denied.

The character of Bellarmin has been very variously represented; but to his talents as a controversial writer, the acrimony of his adversaries may be regarded as even a less equivocal testimony, than the extravagant admiration of his friends. No champion of the church of Rome ever defended her cause with more zeal or ability. His works were regarded by the Protestants as so many bulwarks planted around the papal throne, which could not be assailed with any hope of success, till these bulwarks were first battered down. Every divine, therefore, who waged war against papacy singled out Bellarmin as the principal object of his attacks, and it is said that a new lecture was instituted in both the English universities, for the express purpose of confuting his arguments. The modes of hostility practised against this arch enemy of the reformation, varied with the temper and abilities of his assailants. He himself set them an example of fair and honourable warfare, which they would have done well to imitate. He disdained the low artifices of concealment and misrepresentation; and confident in his own power of reply, stated the arguments of his opponents so fully and forcibly, that it has been alleged that his writings contain the best defence of those doctrines which he meant to refute. It is certain that his candour in this respect gave so much offence and alarm to many zealous Catholics, that they wished his writings to be suppressed; lest the heretics should make use of them to their own advantage, and the Catholics should be imposed upon by not understanding the answers so well as the objections. His most celebrated work is entitled *A Body of Controversy*, the arrangement of which is clear and methodical, the reasoning ingenious and profound, and the style, if not elegant, at least nervous and plain. That a controversial work of four folio volumes, particularly if written in a bad cause, should contain inconsistencies, is almost unavoidable; and the adversaries of Bellarmin have exposed his contradictions with as much triumph as if they completely invalidated his ablest arguments. This is more excusable, however, than the calumnies which they have forged against his character. A libel was published against him, while he was yet alive, stating many circumstances which occasioned, attended, and followed his death. Among other accusations it was pretended, that he had caused many children to be smothered in order to conceal his incontinence; that, touched with remorse, he repaired to Lore
piate his crimes by confession, but that the
whom he made the avowal, was struck
horror, that he abruptly ordered him to de
that Bellarmin died in despair.—Bellarmin
laughed at the charge, which was the mo
bable that the blindness of malice could d
so exemplary was his purity, that on an i
placed under his picture, it could be reco
he preserved his chastity and his baptismal i
and that he never told a lie. His temp
mild that he could bear the greatest injuri
resentment, and rather than molest the mea
would allow them to incommode him
since to fly and stop where they please is
heaven, of which it would be cruel to dep
At his death he bequeathed one half of
Jesus Christ, and the other half to the Virg
and with his latest breath enjoined a friend
to the public, that he died in the same fa
he had always professed and maintained.
Body of Controversy, he wrote *A Treatise*
siastical History; A Treatise on the Tem
thority of the Pope; The Groans of the
the Obligations of Bishops; A Commenta
Psalms; A Hebrew Grammar; and *Serm*
General Biography; Ancillon's *Melange C*
Literature, tom. i.; and Mosheim's *Ecclesi*
vol. iv. p. 221, &c. (*k*)

BELLEISLE, an island of France, in t
ment of Morbihan, situated in the Bay o
about six leagues from the coast of Fran
about six leagues long, and two broad, and
rounded with sharp pointed rocks, that the
ly three places, well fortified, by which
can be attacked. The soil of this island,
fertile, is manured by means of a weed ca
mon, or vareck, which is constantly thr
their shores. Corn of different kinds is
duced in abundance, and form the article
commerce. The principal commerce of
however, consists of sardines, which are fish
coast to the extent of 3000 barrels a year,
rel containing about nine or ten millions of
No fewer than 150 chaloupes, of two or
each, are employed in this fishery, which
on from June to October. A barrel of oil f
about thirty or forty barrels of sardines, by
small holes pierced in the bottom of ea
The sardines are exported to Bilboa, St
Bayonne, and all the places along the Garo
the oil is partly consumed in the island,
exported to Bourdeaux and Nantes. T
commerce of the island is said to produce
between 140 and 160 thousand francs.
also salt marshes in this island. Belleisle
longed to the family of Fouquet, and was
for the county of Gisors. Palais and B
the chief places of the island, which con
wise about twenty villages. Chantreau
place of his *Science de l'Histoire*, makes t
tion of Belleisle 2436, and in another bet
and six thousand. West Long. 3° 6' 3
Lat. 47° 17' 30". (Q)

BELLENDEN, JOHN, archdeacon o

that she charged him with an attempt upon her virtue. Prætus, unwilling to inflict punishment on Bellerophon, sent him to Jobates, the queen's father, with injunctions to put him to death. Jobates refused to execute this cruel command; but complied so far with the request of Prætus, that he sent him on several dangerous expeditions against the Chimæra, against the Solymi, and against the Amazons, from all which he returned in triumph. Proud of the valour of Bellerophon, the king of Lycia gave him his daughter in marriage, and appointed him his successor on the Lycian throne. See Homer's *Iliad*, lib. vi. v. 156. *Apollod.* lib. ii. cap. 3.; lib. iii. cap. 1. Hygin. *Fab.* 157. and 243. Hesiod *Theog.* v. 325. *Pausan.* lib. ix. cap. 31. *Horat.* lib. iv. od. 11. Bochart, *Phaleg.* lib. 1. cap. 6. *Anc. Univers. Hist.* vol. v. p. 97. (H)

BELLES LETTRES, a term synonymous with polite literature and rhetoric. See RHETORIC.

BELLINZONE, or BELLENTZ, a town of Switzerland, and capital of a department of the same name, is a beautiful town situated at the foot of Mount Cenero, on the east bank of the Tesino, below its junction with the Musa. "It is situated," says Mr Coxe, "in a delightful plain, encircled with ancient walls and battlements in good repair; to the right rise majestically the ruins of an ancient castle; to the left, separately embosomed in trees, are the castles of the bailiffs of the three regent cantons, Uri, Schweitz, and Underwalden."—"The interior of Bellinzone by no means corresponds with its external beauty and situation; the streets are narrow, and the houses ill built." It is, however, adorned with several elegant churches, and has numerous convents. The history of this town will be found in Coxe's *Travels in Switzerland*, vol iii. p. 301—309. E. Long. 8° 44′, N. Lat. 46° 4′. (*j*)

BELLIS, a genus of plants of the class Syngenesia, and order Polygamia Superflua. See BOTANY. (*w*)

BELLIUM, a genus of plants of the class Syngenesia, and order Polygamia Superflua. See BOTANY. (*w*)

BELLONA, the goddess of war, was either the sister, or the daughter, or the wife of Mars. She prepared the chariot of Mars; she attended him in the field of battle, drove his chariot through the combatants, and animated them to war, with the bloody whip in her hand. This goddess had a temple at Rome, and was worshipped at Comana in Cappadocia, where she had above 3000 priests, who were consecrated to her service by making deep incisions in their thighs, and reserving the blood as a sacrifice to their mistress. In the time of Severus there was in York a temple dedicated to Bellona. See *Pausan.* lib. iv. cap. 30; *Juvenal*, sat. iv. v. 127; Hygin, *Fab.* 274; and Bryant's *Ancient Mythology*, vol. i. p. 45. (*j*)

BELLONIA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

BELLOWS, the name of a machine by which air is propelled with great velocity through a tube, or aperture. See BLOWING *Machines*. (*w*)

BELLUNESE, a mountainous district of Italy, formerly belonging to Venice, but now forming a part of the kingdom of Italy. Corn, wine, and fruits of all kinds, are produced here in abundance; numerous herds of cattle are bred on the rich pastures; the forests produce great quantities of timber, which are floated down the Piava to Venice; and the mountains are rich in iron, lead, vitriol, and copper. The lake of Alleghe, in this district, was formed in a very singular manner in the year 1771. The mountain Spitz, shaken by some subterraneous convulsion, buried in its ruins seven villages situated at its base, with all their inhabitants. It filled the bed of the Cordevola, which, swelling in every direction, swept away the village of Alleghe, and formed a lake, two Italian miles long, and half a mile broad. The population of this district amounts to about 47,500. (H)

BELLUNO, a town of Italy, and capital of the Bellunese, is situated on the river Piava, by means of which the inhabitants carry on a good trade in wood and timber. This town contains many excellent buildings and marble fountains, an expensive aqueduct, 14 churches, besides several monasteries, nunneries, and hospitals. Population 7400. E. Long. 12° 15′, N. Lat. 46° 10′. (*j*)

BELOMANCY, from βελος, an *arrow*, and μαντεια, *divination*, is a method of foretelling future events by means of arrows, which was used among eastern nations, but particularly among the Arabians. (*j*)

BELTS. See ASTRONOMY *Index*.

BELUR. See BUCHARIA.

BELUS. See BABYLON.

BEMBA, BEMBEA, or BEMBI, a province of the kingdom of Angola, in Africa. It partly extends along the coast, and is traversed by the river St Francisco, or Lutano, which swarms with sea horses, crocodiles, and serpents, that devour the fish, and injure the adjacent grounds. Great numbers of large and small cattle are reared in this province. The fat of these animals serve the inhabitants for ointment to their heads and bodies, while their skins, roughly dressed, furnish them with clothing. The inhabitants speak a language peculiar to themselves, though their idolatrous rites resemble those of their neighbours. See Dapper's *Description de l'Afrique*. (*j*)

BEMINSTER, or BEAMINSTER, a populous and flourishing town of England, in Dorsetshire, situated on the river Bist, in a deep and fertile vale, surrounded with numerous gardens and orchards. It has a manufactory of sail-cloth, and others of iron and copper goods. Population 2140, of whom 1562 were returned as employed in trade. Number of houses 311. See Hutchins' *History of Dorsetshire*. (*j*)

BEN-NEVIS. See INVERNESS-SHIRE.

BENARES, the holy city of the Hindoos, and the grand repository of their science and mythology, is situated on the northern bank of the Ganges, in 25° 30′ N. Lat., about 460 miles north-west from Calcutta.

The irregular and compressed manner which has been invariably adopted in forming the streets of Benares, has destroyed the effects which symmetry and arrangement would have otherwise bestowed on a city, entitled, from its valuable buildings, to the first place among the capitals of India. The streets are so extremely narrow as not to admit of two common carriages abreast. In addition to the pernicious effects which must proceed from a confined atmosphere, there is, in the hot season, an intolerable stench, arising from the many pieces of stagnated water dispersed in different quarters of the town; the filth also, which is indiscriminately thrown into the streets, and there left exposed, (for the Hindoos possess but a small portion of general cleanliness,) adds to the compound of ill smells, so offensive to the European inhabitants of this city.

The following, and most recent account of Benares, is taken from Lord Valentia's Travels: "The houses are built with stone, some six stories high, close to each other, with terraces on the summit. They are whimsically painted, and the architecture is as extraordinary. Bands of carved work run, in general, round each story, by no means despicably executed; and the large masses of stone used in the walls, together with the neat manner in which they are joined, show that the masons are very tolerable workmen. The windows are extremely small, and probably they are formed in this manner to answer two purposes; first, to prevent the opposite neighbours from overlooking the apartments; and secondly, to keep the houses more cool during the winds. Our style of architecture is by no means adapted to the climate, and the large windows would be insufferable, were it not for the tattys, (or screens composed of the roots of sweet-scented grass, on which water is constantly thrown to cool the air,) which are easily applied to a house one story high, but would be impracticable in a house of six stories, and situated in a town. It is seldom that the universal custom of a country is not founded on reason: though, therefore, they have larger windows in their country houses, which can be cooled by artificial means; yet up stairs, where that cannot be done, they reduce the apertures as much as possible. The opposite sides of the streets, in some places, approach so near to each other, that they are united by galleries. Several new houses are building on a very handsome scale, and the town, in general, had an appearance of prosperity, which is by no means deceitful. The city of Benares is so holy, that several Hindoo rajahs have habitations there, in which their vakeels, or envoys, reside, and perform for them the requisite sacrifices and ablutions. The land is extremely valuable, and law-suits respecting it most frequent. The number of stone and brick buildings, from one to six stories high, is upwards of 12,000. The mud houses upwards of 16,000. The permanent inhabitants are upwards of 58,000, besides the attendants on the three princes, and several other foreigners, who may amount to near 3000; but the concourse during some of the festivals is beyond all calculation. The Mahometans are not one in ten." Vol. i. p. 104.

Such is the account which Lord Valentia gives of the population of Benares. But there is evidently a gross typographical error which materially affects the calculation. The number of houses of all descriptions is stated to amount to upwards of 28,000, whilst the population is stated at 58,000; allowing little more than two to each house, though there are whole streets composed of houses six stories high. It is evident, then, from the nature of the case, and also from the appendix to which his lordship refers us, that the inhabitants of Benares should be estimated at upwards of half a million.

Benares presents a strange appearance of prosperity and wretchedness, of the highest affluence and the most abject poverty. "In going into a mosque," says Tennant, "thousands crowded round us, soliciting charity with an importunity I never before witnessed, and which I could not then resist. Hunger, wretchedness, and disease, seemed to meet the eye in every direction: what increased our uneasiness, was the impossibility of affording relief to such crowds, whose famished multitudes pressed forward to succeed such as you had sent away with a pittance of supply. It is not any scarcity, or any extraordinary degree of poverty, that occasions this concourse of beggars, but the number of pilgrims who come from all parts for the purpose of devotion and charity." *Indian Recreations*, vol. ii.

Although Benares cannot now boast the glories of science, it is still the grand seat of Braminical learning, and presents many monuments of its former splendor. There is still remaining a stupendous observatory, containing a great number of astronomical instruments, all formed of stone, and constructed with the utmost exactness. A particular description of the observatory and instruments is given by Sir Robert Barker, in a letter to the president of the Royal Society of London, which was read before the society in May 1777. Students still resort, in great numbers, to Benares, where they are instructed, not, as in Europe, by a number of professors, but each Bramin, who undertakes the instruction of youth, receives a limited number of pupils, from four to ten or twelve, according to the celebrity of the teacher. With these preceptors they spend many years in studying Sanscrit, mythology, and metaphysics.

There is a great number of Hindoo temples in Benares, dedicated to their almost innumerable gods. There is a spacious mosque, with lofty minarets, built by Aureng-zebe, on the site of a temple sacred to Mahadeva, which was destroyed to make room for it. This Mahometan pile erected on this sacred spot, was intended by the bigotted and intemperate zeal of the tyrant to insult the religion of the Hindoos; and it has completely answered the purposes of its erection; for they consider this monument as the disgraceful record of a foreign yoke, proclaiming to every stranger, that their favourite city has been debased, and the worship of their gods defiled. From the top of the minarets is seen the entire prospect of Benares, which occupies a space of about two miles and a half along the northern bank of the Ganges, and generally a mile inland from the river. See Forster's *Travels*, vol. i. (*v*)

BENBICULA, one of the Hebrides, or Western Isles of Scotland, which lies between the islands of North and South Uist. From the great similarity between Benbicula and these islands in their soil, agriculture, production, and general management, we shall reserve our historical account of this island to the article Uist. See Macdonald's *General View of the Agriculture of the Hebrides*, p. 779, Edinburgh, 1810. West Long. 7° 12′, North Lat. 57° 25′. (*w*)

BENCOOLEN, a sea-port town on the south-west coast of the island of Sumatra. After the Eng-

Bencoolen, Bender.

lish had lost the pepper trade of Bantam, they formed a settlement here in 1685, and Fort York was built by the East India Company in 1690. As the town and fort, however, stood on a stinking morass, a great mortality prevailed among the settlers in 1693, and the governor and council fell victims to the insalubrity of the climate. A new fort was therefore begun in a more healthy situation in 1719; but the jealousy of the natives prompted them to set fire to the fort, and the houses of the English, and compel the governor and garrison to embark for Batavia. The fears of the natives having subsided, the English were in the year following permitted to return and finish their fort, which received the name of Marlborough Fort. In the year 1760, Bencoolen was taken by the French, and Fort Marlborough destroyed. In 1763, when it was restored to the English, and Manilla ceded to the Spaniards, several Chinese merchants removed their families from Manilla to Bencoolen, where they all perished in a short time.

The town, which stands upon a morass, is about two miles in circuit, and is distinguished by mariners by means of the lofty mountain called the Sugar Loaf, which is situated in the interior of the island, about 20 miles from Bencoolen. A large and commodious bay is formed by an island which fronts the town, and by the point of Silleban, which stretches about two or three leagues to the south of it. The inhabitants of Bencoolen, whose houses are built on bamboo pillars, are mostly carpenters, who hire themselves to work in the English fort. Some of them gain their subsistence by fishing, and others by planting rice and pepper trees. The pepper, which forms the principal article of commerce, is brought from the interior by a river which runs north-west of the town; but a bar at its mouth occasions a considerable inconvenience in the shipping of it. The soil of the surrounding country is a fertile clay, which produces long grass. The country is in general woody and mountainous, and near the sea, it is a complete morass. East Long. 102° 3′, South Lat. 3° 50′. See Marsden's *Account of Sumatra;* and also SUMATRA. (H)

BENDER, TEGIN, or TEKIN, a fortified town of European Turkey, and the capital of Bessarabia, is situated on the right bank of the Dniester, and is celebrated as the residence of Charles XII., when he threw himself on the protection of the Turks after the battle of Pultowa. Bender received its name from Bajazet II., when, on his death-bed, he commanded his successor Selim I. to erect a fortress in this place, having ended his exhortation with the words *Ben-Derim*, or *I command thee*. The fortress, which is only remarkable for the immense ditch which encompasses it, contains 300 cannon, 25 mortars, and three howitzers, beside an abundant supply of powder, balls, rice, meal, &c. &c. On the inner wall of the castle, or old fortress, Campenhausen observed two inscriptions, one of which was effaced, and the other written in Arabian, of which the following is a translation: Built by order of the "Stambulian Padischa Beyza-Devoly, by the powerful Padischa Sultan Selim Hazy." There are two suburbs, twelve mosques, six inns, or khauns, and seven gates; viz. the gate of Constantinople, the tanners gate, the gate of Varna, the water gate, the Uul gate, the Orda gate, and the stone gate; two of these gates are marked with inscriptions, one of which is peculiarly important, as it proves, in opposition to the testimony of the Hungarian historian, that Tegin was taken by storm, and not by treachery. The following is a literal translation:

"I, by the grace of the Highest, the first of all emperors in the world, Sultan, form of God, and of his prophet Muhamed, companion of the Lord, conqueror of the world, and of the Woywod Peter, and of Bogdania, I, Solyman, seal-bearer of the temple of the only God, I, I have wrested the fortress of Tegin and its garrison from the King of Germany; I have taken it by storm, in the presence of all the chiefs of my ever invincible army; and I have given orders to have the stones taken from the castle of Palanka, to build this wall and gate; and the fortress shall be named Ben-Derim. In the year of the Hegira 965."

The principal mosque, called Muynkar-Dgammid, is a kind of cathedral where the people assemble on Fridays only, in which alone it is lawful to pray for the Sultan. The streets of Bender are narrow, gloomy, and dirty, and the carcases of horses, oxen, dogs, &c. lie putrifying in the streets. The inns are large square buildings resembling convents; the windows look into a court yard, encircled with a high wall; and there is a number of small chambers without furniture, in which travellers lodge, and foreign merchants expose their goods to sale.

The large metsched, or mosque, is a building 58 paces square, and is the finest edifice in Bender. Over the principal entry, is a cornice containing a verse of the Koran, written in golden letters. A metal bason is suspended by a chain in a niche, opposite the door; and on the left of this, there is a recess with a representation of the Kaba, and the tomb of Mahomet. To the right of the metal bason is a small pulpit, with ten steps covered with red cloth, from which the Iman reads the Koran. The floor is adorned with rich carpets, and divans are placed round the walls. There is a cupola in the middle of the building, ornamented with a red star, from the centre of which is suspended a lustre, having its branches loaded with several hundreds of glass lamps of various colours. Several ostrich eggs are suspended above this lustre. A prayer against the plague is written on the wall, and on one side is a painting of the sabre of Ali. The ruins of the house where Charles XII. resided, and the remains of his entrenchment at Varnitza, are still to be seen; but the inhabitants are completely ignorant that their town was honoured with the presence of this distinguished hero.

There is a great number of tanners in Bender, three paper manufacturers, several smiths, and a watchmaker. The paper is made of cotton, and smoothed with glass, and the ink is obtained from the bark of the alder. Bender is the residence of the principal Sandgiack of Bessarabia, who has an yearly salary of £3000 sterling, and a number of provincial governors under him.

Bender is celebrated for the famous siege which it underwent in the year 1770. On the 30th of July, the Russian army under Count Panin, opened their trenches and bombarded the town, but the garrison and the inhabitants defended themselves with great bravery, and annoyed the besiegers by numerous sorties. A new species of mine, called the globe of compression, invented by a French engineer, was tried on this occasion for the first time. It was charged with 16 pounds of powder, and blew up at ten o'clock at night with most tremendous effect. Amidst the terror and uproar which attended this fatal explosion, the Russian soldiers began their assault. Having got possession of all the out-works, they climbed the walls in every quarter; a furious contest ensued, and the streets, and even the houses, were filled with the bodies of the besiegers, and the brave inhabitants. Irritated at the resistance of the garrison, the Russians set fire to the town; but they were still unable to subdue the ferocious spirit of the Turks, which displayed itself even amidst the ruins of their houses, and their walls. A chosen band of 1500 cavalry, and 500 infantry, were cut to pieces in attempting to force their way through the besiegers. The Seraskier, who had retired to the citadel, did not surrender till every thing around him was in flames. The number of prisoners, including the inhabitants, amounted to 11,749, the remains of a population of 30,000, the rest of whom perished during the siege. Population 8200. East Long. 29° 57', North Lat. 47°. (H)

BENDER ABASSI. See GOMBROON.

BENDER MASSIN, or BANJAR MASSIN. See BANJAR MASSIN.

BENDER RIGK, BUNDARIK, or RIK, is a city of Persia, situated on an arm of the Persian Gulf, in the province of Kerman. It is surrounded with walls, and is the capital of a petty state, which comprehends several other places in Kermesir. "The Arabs of this principality," says Niebuhr, "are chiefly addicted to a sea-faring life; the Persians inhabiting its back parts are husbandmen. The reigning family of Bender-Rigk are of the Arabian tribe of Beni-Saab, and are originally from Oman; but the grand-father of the present prince having become a Shute, and married a Persian lady, this family are no longer counted by the Arabs among their genuine nobility." The cruelties, and history of Mir Mahama, which are not worthy of being recorded, will be found in Niebuhr's *Travels*, Sect. xxiii. chap. iv. East Long. 51° 17', North Lat. 29° 30'. (Q)

BENEDICTINES, an order of monks, instituted A. D. 529, by Benedict of Nursia, from whom they had their name. The object of the founder was to establish an order which should be distinguished by the mildness of its discipline, and the regularity of its members; and which should afford greater opportunities of piety, and of usefulness, than any of the existing orders. His rule of discipline was not ill calculated to produce these advantages, had not the inherent defects of monachism counteracted its operation, and defeated its salutary tendency. So convinced was he of the efficacy of his plan, that those who were admitted into the order were solemnly bound to preserve its rules inviolate, and not to alter them by any kind of modification. As the existing orders in the west had been degraded by manifold corruptions, the rule of Benedict soon came into great celebrity. In France, Italy, England, and Germany, it soon arrived at the highest pitch of glory: the other orders continued to maintain a languishing existence, till about the ninth century, when the Benedictine absorbed all the other religious societies, and held unrivalled the reigns of monastic empire. The monks considered the predominating influence of their order, as an attestation from heaven in favour of its sanctity and usefulness. This was all fair; but it was not thought sufficient: and they must have their miracles to support the credit of their order. In one sense, perhaps, they were right; for the prevalence of any of the monastic orders could only arise from the miraculous ignorance and stupidity which had overwhelmed Europe.

But this celebrated order had scarcely reached the zenith of its glory, when it began to exhibit the symptoms of decline. Wealth has truly been the root of all evil, in all the monastic institutions. In spite of the vows of poverty and mortification, which the initiated had solemnly made, they began to think that it was but reasonable to appropriate to their own convenience, some of that superstitious wealth, which the mistaken liberality of the public had conferred, and as soon as this rule was adopted, the rule of St Benedict was but little heard of. To use the words of Mosheim, "they sunk into luxury, intemperance, and sloth, abandoned themselves to all sorts of vices, extended their zeal and attention to worldly affairs, insinuated themselves into the cabinets of princes, took part in political cabals, made a vast augmentation of superstitious rites and ceremonies in their order, to blind the multitude, and supply the place of their expiring virtue; and, among other meritorious enterprises, laboured most anxiously to swell the arrogance, by enlarging the power and authority of the Roman pontiff." Vol. ii. p. 118.

In short, it appears that they fell from the high rank which they had so long held in the estimation of the world, by the same means which afterwards hurled their patron, the Pope, from the seat of his authority and power; by presuming a little too much on the indulgence and simplicity of mankind. But whatever might be the cause of their decline, it appears, that about the middle of the tenth century, they stood in vehement need of reformation. This regeneration was attempted with considerable success by Odo, Abbot of Clugni, who, in endeavouring to reform the order, in a great measure superseded it by one of his own, and the *order of Clugni* soon became almost as famous over Europe as had been that of Benedict.

We would refer such as wish for farther information on this subject, to Milner's *History of Winchester*. (γ)

BENEDICTION, in a general sense, is the act of blessing, or of praying to God for a divine blessing; but it is also used to signify praise, or a grateful acknowledgment of blessings received. Hence it has been applied to the act of saying grace both before and after meals. Among the Jews, benedictions were of various kinds. The original institution of them is to be found among the patriarchs. From the time that God entered into covenant with Abraham, and promised extraordinary blessings to his posterity, it was customary for the father of each family, some time before he died, to call together his children, and inform them, accord-

Benediction.

ing to the knowledge which it pleased God then to give him, how, and in what manner, the divine blessing conferred upon Abraham was to descend among them. Upon these occasions, the patriarchs enjoyed a divine illumination, which enabled them to look back into futurity; and, under its influence, their benediction was deemed a prophetic oracle, foretelling events with the utmost certainty, and extending to the remotest period of time. These blessings descended to the eldest son of the family, and to his latest posterity, unless forfeited by their bad behaviour. To him belonged the birth-right, or right of primogeniture, by which he could claim the particular blessing of his dying father; and to him, and to his posterity, belonged the blessings of the covenant which God made with Abraham, that from him the promised Messiah should descend. Solemn blessings were also pronounced, that is prayed for, by the priests upon the people. "On this wise," says Moses to Aaron, "ye shall bless the children of Israel, saying unto them, the Lord bless thee, and keep thee: the Lord make his face to shine upon thee, and be gracious unto thee: the Lord lift his countenance upon thee, and give thee peace." The prophets also, and other inspired persons, frequently blessed the servants and people of God, of which many instances are to be found in the Psalms. Among the Jews too, there was a ceremony which they called the cup of blessing, and which was observed in this manner. The master of the house having asked a blessing, took a cup full of wine, tasted it, and handed it to the person next to him, who did the same till it had gone round the whole company. This was called the blessing of the wine. Next followed the blessing and breaking of the bread, which was in the same manner distributed among the guests. When the repast was ended, he returned thanks in name of the whole company. In this cup of thanksgiving, they blessed God for their present refreshment, for their deliverance out of Egypt, for the covenant of circumcision, and for the law given by Moses; and prayed that God would be merciful to his people Israel, that he would send the prophet Elijah, and that he would make them worthy of the kingdom of the Messiah. Under the name benediction, the Jews also include presents sent by one friend to another, probably because accompanied with blessings or good wishes. Even their friendly salutations partook of the nature of benediction. "God be gracious unto thee, my son," were the words with which Joseph received Benjamin. In any country of Europe, this would be considered as a benediction; but in the East, it is used merely as a salutation, similar to those offers and assurances of friendship which we make, when we first address or take leave of a friend. This accounts for the reason why the scriptures so often call the salutations, and farewells of the East, by the term *blessing*. Various benedictions are still in use among the Jews, the form and order of which are prescribed by the Talmud.

Among the Jews, as well as among Christians, benedictions were conferred by the imposition of hands, to which the latter afterwards added the sign of the cross. Hence in the Romish church, benediction is used to denote the sign of the cross, as made by a bishop, which is supposed to confer some grace or blessing upon the people. The custom of receiving benedictions, by bowing the head before the bishop, is very ancient; a mark of religious respect to which even emperors deigned to submit.

Benediction is also used for that religious ceremony, by which a thing receives a sacred character and use. The spirit of superstition, in the church of Rome, has multiplied these religious rites to an astonishing degree, in order to strike the imagination, and captivate the minds of the multitude. In general they are performed by aspersions of holy water, signs of the cross, and prayers suitable to the nature of the ceremony. Whoever wishes to see a particular account of them, may consult the book of ecclesiastical ceremonies, published in the pontificate of Pope Leo X., and father Martene's work on the rites and discipline of the church. The Pope began all his bulls with, *Salutem et apostolicam benedictionem*. (A. F.)

BENEVENTO, a city of Italy, in the kingdom of Naples, and capital of the Principato Ultra, is situated at the junction of the Sabato and Calore, at the extremity of a hill which lies between these rivers. This town is celebrated for containing several beautiful remains of Roman sculpture and architecture. The Porta Aurea, which forms one of the entrances to the city, is an elegant monument of white marble, of the Composite order, consisting of an arch whose span is 20 palms, and height 35. It was built by Trajan about the year of Christ 114, and commemorates, on basso relievos, the battles of the Dacian war. There is scarcely a wall in the upper town of Benevento that is not composed of the precious ruins of ancient tombs, altars, and pillars of entablatures. The cathedral, built in the 6th century, has no claims to particular notice. An Egyptian obelisk of red granite, loaded with hieroglyphics, ornaments the court of the cathedral. Population, 10,000. East Long. 14° 38′, North Lat. 41° 7′. See Swinburne's *Travels in the Two Sicilies*, vol. ii. p. 336. (F)

BENGAL.

Bengal.

BENGAL, the most eastern province of Hindostan, and one of the fifteen *Soubahs*, into which that empire was divided in the reign of Acbar, is situated on each side of the river Ganges. It is bounded on the north, by Asam, Bootan, and Bahar; on the south, by Orissa, and the bay of Bengal; on the west, by Bahar, Berar, and Orissa; and on the east, by a range of mountains, by which it is separated from Cassay, Aracan, and the Birman dominions. Its greatest length, from east to west, is about 7[illegible] miles; and its greatest breadth, from north to south, is about 300; extending from 21° 30′ to 26° 40′ N. Lat., and from 86° to 92° 30′ E. Long. "The natural situation of Bengal is singularly happy with respect to security from the attacks of foreign enemies. On the north and east, it has no warlike neighbours; and has, moreover, a formidable barrier of mountains, rivers, or extensive waters, towards those quarters, should such an enemy start up. On the south, is a sea-coast, guarded by shallows and impenetrable woods, and with only one port (and even that of difficult access) in an extent of 300 miles. It is on the west only, that any enemy is to be apprehended; and, even there, the natural barrier is strong; and with its population and resources aided by the usual proportion of British troops, in addition to the Sepoy establishment, Bengal might bid defiance to all that part of Hindostan, which might find itself inclined to become its enemy." Rennel's *Memoir*, p. cxv.

As the province of Bengal lies almost entirely within the torrid zone, and borders on several extensive sandy wastes, it is subject to great extremes of heat; and is accounted more unhealthy to Europeans, than any other British settlement in India, except that of Bencoolen. The south-east quarter especially, in which the town of Calcutta is situated, and which is a flat marshy country, was deemed at first almost as destructive as Batavia: and at one period, when the whole Europeans resident in Calcutta did not exceed 1200, 400 burials were numbered in six months. The great and general cause of disease, in this country, is an excess of bile, which occasions fevers, dysentery, inflammation of liver, with a long train of nervous affections. These diseases are most prevalent in the months of September and October, are generally very rapid in their progress, and chiefly attack those, who are newly arrived from Europe; but the introduction of a more temperate and regular mode of living, and the more intimate acquaintance which the medical practitioners have acquired with the peculiar diseases of the country, have contributed to render their attacks less frequent and fatal. The varieties of disease are not numerous; their treatment is extremely uniform; almost every stage has its appropriate remedy; and no where are the prescriptions of the physician more certainly followed with success. By cutting canals, by draining the offensive marshes, and by clearing the ground of trees and jungle, the climate has been already, and may be expected to be still farther, improved; but with all that can be done, it must always prove a severe trial to every European constitution. Even those, who are not materially injured by its influence, are scarcely capable of any exertion, and during the hot season, particularly, it is not uncommon to find the whole officers of a battalion, except one or two individuals, utterly unfit for duty; and this without any extraordinary or alarming complaint. This insalubrity is supposed to be owing, in a great measure, to the prevalence of the hot winds, which are occasionally loaded with sandy particles, which are peculiarly pernicious to persons asleep, and frequently so suffocating as to be almost insupportable by the natives themselves; but principally to the stagnate waters and putrescent substances, which are left upon the flat surface of the country, by the frequent inundations of its rivers. The seasons are here commonly distinguished by the terms hot, cold, and rainy; but the natives subdivide them into six, comprizing two months in each. The hot season continues from the beginning of March to the end of May; and during this period, the thermometer very frequently rises to 100, sometimes even to 110; but in the middle parts of Bengal the extreme sultryness of the weather is greatly moderated by occasional thunder storms, accompanied with rain or hail, driven by sudden gusts of north-west wind; while in the eastern districts, milder showers of rain are still more frequent, and peculiarly refreshing to the heated atmosphere; but in the districts contiguous to Bahar, a parching wind from the west, continues during the greater part of the season. The rainy season commences in June, and lasts till October; and during the two first months, the rain is so heavy and constant, that frequently three, four, and even five inches of water have fallen in one day; but during the two last months, there are frequent intermissions of the rain, the weather is rather close and sultry, and thick unwholesome fogs prevail. The cold season continues from November to February, during which period northerly winds prevail, the sky is clear and unclouded, and the weather generally pleasant to an European constitution. The dews during the night are abundant and penetrating, and greatly assist the progress of vegetation; while, in the more mountainous districts, even frost and extreme cold are frequently experienced.

General aspect.

The general aspect of Bengal is that of a champaign country, intersected by numerous rivers, and surrounded by chains of lofty mountains. That part of the Delta through which the Ganges expands his branches as he approaches the sea, is the lowest district in the province, and seems as if newly emerging from the waters. It is called the *Sunderbunds* or woods; lies between the river Hoogly and Chittagong; and is equal in extent to any of the three kingdoms of which Great Britain is composed. It is a labyrinth of creeks and rivers, of jungle and stagnated water, a dreary uninhabited waste, infested by boars and tygers; but its numerous canals are so disposed, as to form a complete inland navigation throughout the Lower Delta. It abounds in quantities of salt, equal to the whole consumption of Bengal and its dependencies; and it furnishes an inexhaustible store of timber for fire-wood, domestic uses, and boat-building. Some attempts have been made, and with considerable prospect of success, to clear and cultivate this inhospitable tract; but, as land in every part of India is yet very imperfectly occupied, there is no sufficient stimulus to make new acquisitions; and, as it is deemed by some a matter of policy to have such an extensive desart lying between our possessions, and the only point of attack from an European enemy, there is not much encouragement given to the cultivation of the Sunderbunds. Within the boundaries of the province, and particularly in the south-west angle, and on the north of the Ganges, are to be found more elevated tracts of land, remarkable for picturesque scenery, and for the neat habitations of the peasantry. These upper regions, however, which are not liable to inundation, and which were formerly called Baréndra, are of very inconsiderable extent, and of very inferior estimation in the views of commerce and finance. The principal division of Bengal, and that which is most valuable for its produce and manufactures, is an extensive and uninterrupted level, through which the Ganges and Burrampooter slowly roll their immense volumes of water, and which they annually overflow in the rainy season.

Bengal.

Soil.

The general soil of Bengal is a congeries of clay, mixed with a considerable portion of sand, fertilized by various salts, and by immense quantities of decayed vegetable and animal substances. It is a rich, blackish mould, extremely loose in its texture, extending to a very great depth, (to six, fourteen, and even to twenty feet,) lying on a bed of sand, interspersed with shells and rotten wood, affording every indication of a country gained from the sea, and formed by deposition from the waters of the rivers, and of the annual inundations. In proof of this supposition it may be mentioned, that similar processes are continually affected by the rivers bursting from their beds; and that there are frequently found at the depth of 20 or 30 feet the wrecks of boats, with their anchors and other implements, which seem to have been sunk in some remote period, when the soil was lower, or when this vast plain formed a part of the sea.

Inundations.

These inundations, to which the province of Bengal in a manner owes its origin, aud upon the due proportion of which its prosperity annually depends, form the most interesting object of attention to the natives, and must hold a prominent place in every account of the country. The following description of these periodical floods, the most distinct with which we are acquainted, and the least capable of abridgment, is submitted to our readers in the identical words of the eminent geographer, from whose pen it proceeded. The Ganges " appears to owe its increase as much to the rain water, that falls in the mountains contiguous to its source, and to the sources of the great northern rivers, that fall into it, as to that which falls in the plains of Hindostan; for it rises fifteen feet and a half out of thirty-two (the sum total of its rising) by the latter end of June; and it is well known, that the rainy season does not begin in most of the flat countries till about that time. In the mountains, it begins early in April; and by the latter end of that month, when the rain water has reached Bengal, the rivers begin to rise, though by very slow degrees; for the increase is only about one inch per day for the first fortnight. It then gradually augments to two and three inches, before any quantity of rain falls in the flat countries; and, when the rain becomes general, the increase, at a medium, is five inches per day. By the latter end of July, all the lower parts of Bengal, contiguous to the Ganges and Burrampooter, are overflowed; and form an inundation of more than a hundred miles in width, nothing appearing but villages and trees, excepting very rarely the top of an elevated spot (the artificial mound of some deserted village) appearing like an island. But the inundations in Bengal are as much occasioned by the rain that falls there as by the waters of the Ganges; and as a proof of it, the lands in general are overflowed to a considerable height, long before the bed of the river is filled. It must be remarked, that the ground adjacent to the river bank, to the extent of some miles, is considerably higher than the rest of the country; and serves to separate the waters of the inundation from those of the river, until it overflows. This high ground is in some seasons covered a foot or more; but the height of the inundation within varies, of course, according to the irregularities of the ground; and is in some places twelve feet. Even when the inundation becomes general, the river still shews itself,
by the grass and reeds on its banks, as by
and muddy stream; for the water of the in
acquires a blackish hue, by having been so l
nant, among grass and other vegetables; no
even lose this tinge, which is a proof of
dominancy of the rain-water over that of the
the slow rate of the motion of the inundatio
does not exceed half a mile per hour,) is o
markable flatness of the country. There
cular tracts of lands, which, from the natur
culture, and species of productions, require
ture than others, and yet, by the lowness of th
tion, would remain too long inundated, were
guarded by dikes or dams, from so copious a
tion as would otherwise happen, from the gr
tion of the surface of the river above them.
dikes are kept up at an enormous expense
do not always succeed from want of tenaci
soil of which they are composed. It is c
that the length of those dikes collectively
to more than a thousand English miles.
them, at the base, are equal to the thickn
ordinary rampart. One particular branc
Ganges (navigable only during the rainy se
then equal to the Thames at Chelsea) is c
between two of these dikes for about seven
and when full, the passengers in the boats, lo
on the adjacent country, as from an eminen
ring the swollen state of the river, the tid
loses its effect of counteracting the stream;
great measure, that of ebbing and flowing, e
near the sea. It is not uncommon for a stro
that blows up the river for any continuance,
the waters about two feet above the ordinar
that season, and such accidents have occas
loss of whole crops of rice. A very tragi
happened at Luckipour in 1763, by a stron
wind conspiring with a high spring tide, at
when the periodical flood was within a fo
half of its highest pitch. It is said, that th
rose six feet above the ordinary level. Cer
that the inhabitants of a considerable distri
their houses and cattle, were totally swep
and, to aggravate their distress, it happened
of the country, which scarcely produces a si
for a drowning man to escape to. Embark
every kind traverse the inundation; those b
wards, availing themselves of a direct co
still water, at a season when every stream r
a torrent. The wind, too, which at this sea
regularly from the south-east, favours their
insomuch, that a voyage, which takes up ni
days by the course of the river, when confin
its banks, is now effected in six. Husba
grazing are both suspended; and the pe
verses in his boat those fields, which, in an
son, he was wont to plow; happy, that th
site of the river banks places the herbage
tain within his reach; otherwise his cat
perish." " The inundation is nearly at a
some days preceding the middle of August
begins to run off; for although great qu
rain fall in the flat countries, during Au
September; yet, by a partial cessation of
in the mountains, there happens a deficien

supplies necessary to keep up the inundation." "The decrease of the inundation does not always keep pace with that of the river, by reason of the height of the banks; but after the beginning of October, when the rain has nearly ceased, the remainder of the inundation goes off quickly by evaporation, leaving the lands highly manured, and in a state to receive the seed, after the simple operation of plowing." Rennel's *Memoir*, p. 348, &c.

The intense heats which succeed the rainy season, and which act upon the soil when full of moisture, produce, in Bengal, a luxuriance of vegetation which is unknown in any other country in the world. The lands are easily cultivated, and yield abundant crops without any other manure than what has been deposited by the waters of the inundation. The principal food of the natives, and, consequently, the principal object of the husbandman, is rice; but very good wheat and barley, though much smaller and lighter than in Europe, is also produced. A great variety of different kinds of pulse is raised during the intervals of attention to the white grains, such as pease, chiches, pigeon pease, kidney beans, &c.; and these constitute a very valuable article in Bengal husbandry, as they require very little culture, and thrive readily on the poorer soils. Maize, millet, panic, and other small grains, which are chiefly the food of the poorer classes, are very generally sown, especially in the hilly regions and western districts; and there is a very extensive culture of mustard, sesamum, lintseed, and palma christi, to supply the vast consumption of oil by the natives of the country. The plough of Bengal is drawn by a single yoke of oxen, guided by the ploughman himself; but three pair of oxen are assigned to every plough, and these relieve each other till the daily task be completed. Several ploughs in succession deepen the same furrows, or rather scratch the surface, as it has no contrivance for turning the earth, and the share has neither width nor depth to stir a new soil. A second ploughing crosses the first, and a third is sometimes given diagonally to the preceding. These frequently repeated, and followed by the substitute for the harrow, which is generally nothing more than the branch of a tree, pulverise the surface, and prepare it for the seed. For the extirpation of weeds after the crops have risen above the ground, the labourers employ a short-handed spade, and place themselves at their work in a sitting posture. There are two seasons of reaping in the year; one in April, called the little harvest, which consists of the smaller grains; and another, called the grand harvest, which is wholly of rice, though in some places three crops of this grain are raised in one year. But nothing can be conceived more tedious and injudicious than the mode of reaping. A mixture of different crops is frequently sown together in the same field; and, as these ripen in succession, the husbandman must either gather them singly, which occasions great destruction to the later plants by their being repeatedly trodden down, or must wait till he can reap the whole at once, which causes an equal loss in the more early grains by over ripeness. The corn of every description, after being reaped, is carelessly piled up without any defence from the weather, to be trodden out by the cattle, or threshed by the staff of the husbandman at his convenience; and the grain, after being winnowed in the wind, is stored in jars of unbaked earth, and baskets made of twigs or grass, or is hoarded above ground in round huts, the floor of which, on account of the dampness of the climate and the moisture of the soil, is raised a foot or two above the surface.

With an excellent soil and climate, with almost every variety of cultivated grains, and with a competent number of labourers at a small expense, the imperfection of Bengal husbandry is great beyond what might have been expected. Sufficient attention is not paid to the most proper periods of sowing. No care is employed in selecting the best varieties of each kind of grain. The most valuable crops are not steadily preferred in cultivation. The implements are scanty and incompetent. The rotation of crops is not understood. The dung of the cattle is dried for fuel; and, except in cultivating the sugar cane, mulberry, tobacco, and poppy, no manure is applied. The lands are not duly fallowed and cleaned. Drill husbandry, though known in the more remote countries, is not practised in this province, even in the culture of the sugar cane. There are no inclosures in the country; no capital among the agriculturists; and no roads kept in repair. The former unsettled state of the country exposed the cultivators of the soil to perpetual pillage and oppression. The husbandman has at no time any thing resembling a secure lease, or permanent interest in the fields. Even the genial nature of the climate, and remarkable fertility of the soil, have contributed to prevent that exertion of ingenuity and application of labour, which, in more barren regions, and under more unpropitious skies, have brought the cultivation of the soil to the highest state of improvement. All these circumstances have operated so strongly as obstacles to the progress of agriculture in Bengal, that this most useful and first practised of human arts must be considered as still in its infancy, or as having greatly degenerated.

There is one circumstance, however, peculiar to the lower districts of this province, which frequently renders abortive the utmost skill and diligence of the husbandman; viz. an excess or a deficiency in the annual inundations. When their increase is gradual, the growth of the rice keeps pace with the rise of the waters, is thus always above its surface, and is frequently reaped in boats; but when the inundations rise too rapidly, or much above their ordinary level, the rice is overtopped and destroyed by the flood. The immense and expensive dykes mentioned above, and which are intended to guard against such disastrous occurrences, are frequently found to be very feeble barriers against the gathering stream of the Ganges. Its huge volume of water, bursting through the strongest, or rising over the highest, of its banks, spreads far and wide over the level plains, sweeps away every thing in its course, and covers the richest fields with a bed of barren sand. The fatal effects of a dry season are still more extensive and destructive; and in order to provide some source of relief, under the pressure of such a calamity, numerous reservoirs, called *tanks*, of an oblong square shape, frequently more than an acre in extent, are constructed throughout the country. These being filled with water in the rainy season, afford the inhabitants, during the dry period, a supply of water for domestic uses, superior in quality to that of the Ganges; and, by means of irrigation, form a grand instrument of fertilizing the parched fields. In the higher parts of Bengal, this practice is, at all seasons, an indispensible requisite in husbandry; and as it is there *always* necessary, it is more effectually and industriously administered. "Towards the end of the rains, the fields are well ploughed in the ordinary manner; but, before sowing the seeds, they are divided into little square plots, resembling the chequers of a backgammon table. Each square is surrounded with a shelving border, about four inches high, capable of containing water. Between the square chequers, thus constructed, small dykes are formed for conveying a rivulet over the whole field. As soon as the water has stood a sufficient time in one square to imbibe moisture, it is let off into the adjoining one, by opening a small outlet through the surrounding dyke. Thus one square after another is saturated, till the whole field, of whatever extent, is gone over." (Tennant's *Indian Recreations*, vol. ii. p. 167.) In the flat countries, however, these means of remedying the occasional deficiencies in the fall of the rains, and the flow of the rivers, are not provided with sufficient care; and the reservoirs, water courses, &c. are more generally in a progress of decay, than of improvement.

But no possible precautions can prevent the failure of the crops in unfavourable seasons; and as, in consequence of the feeble and scanty husbandry practised in India, there is very rarely, even in plentiful years, any surplus produce to guard against the effects of a scarcity, the inhabitants of that country, which is, perhaps, the most fertile in the world, are more frequently, than any other people, the victims of absolute want. Even the province of Bengal, the most fruitful in India, was often visited in former times with the same calamity; of which a very dreadful instance occurred in the year 1770, in consequence of an unusual drought. When the granaries of the Nabobs and of the Company began to fail, and rice could no longer be supplied to the poorer classes, thousands of them expired of hunger in the fields, and in the streets of Calcutta. Their dead bodies, mangled by dogs and vultures, tainted the air, and threatened a pestilence, in addition to the miseries of famine. About 100 persons were daily employed by the Company in throwing the dead bodies into the river; which corrupted the water, and rendered the fish unwholesome nourishment. The hogs, ducks, and geese, also, fed so much upon human carcases, that the only animal food which could be used was mutton; while that, on account of the dry season, was so extremely small, that a quarter of a sheep scarcely weighed a pound and a half. By the foresight, however, of Europeans, the benevolent exertions of the East India government, and the peace and protection enjoyed by the husbandmen of this province, the recurrence of such an evil has been in a great measure prevented, its duration shortened, and its pressure alleviated.

Vegetable and animal productions.

The most important of the other vegetable productions of Bengal besides pulse and grain, are tobacco, indigo, cotton, mulberry, poppy, guavas, plantains, pomelos, limes, oranges, pomegranates, melons, pine apples, the banyan tree, the p
nana, the cocoa nut palm, which supplies a ma
ture of cordage, called *coir*; the sugar cane,
thrives in every district, and might be still mo
cessfully cultivated in all; the betle vine, a spe
pepper, raised in almost every village; the
tree, the fruit of which is in the highest estin
and is almost universally used during the hot m
the date tree, which grows every where, and
yields a sweet liquid of an intoxicating quality
which sugar is sometimes extracted; the sur
which also affords, by incision of the stem, a
sweet, inebriating juice, which when sour is som
used instead of vinegar; the areca, in large
tions, the wood of which is tough as whalebon
its nut a useful article of food; and the
abounding in the hilly countries and poorer soi
corols of which are esculent and nutricious, wh
oil is a frequent substitute for butter. In th
dens are cultivated most of the vegetables of
climates fit for culinary purposes. The potato
ticularly, has been introduced with considerabl
cess; and as it thrives best in the dry seasons
are destructive to the rice crops, it might
means, if cultivated to a sufficient extent, of p
the lower classes in Bengal almost beyond the
of famine.

The various sorts of flowering trees and
which either grow wild, or thrive with little
are too numerous to be mentioned in this place
we may notice as the most remarkable and bea
the *chulta*, the flower of which is at first a hard
ball, on foot stalks about four inches in length.
calyx, after the ball has opened, is composed
round, thick, succulent leaves, and the corolla
same number of fine white petals. After cont
only one day, the corolla drops, and the ball
while a succession of these opening and
flowers continues during the space of several
A tall tree, called the *tatoon*, used in borde
walks, the leaves of which are of a deep
green colour, and the fruit resembling an o
a kernel like the date. A large spreading tr
russa, which has a peculiar rich and beautif
ance when in full bloom, as it is then cov
flowers of a bright crimson, or of a brig
or of some intervening shade between
colours. Of this remarkable tree, howeve
that there are only two plants known
one of which is in the neighbourhood
and the other near the Dutch settleme
been mentioned, as one cause of its scarc
ants and other insects are so fond of its
one pod can be found entire and uninjur

Wild boars, bears, wolves, foxes, jac
leopards, panthers, lynxes, hares, deer
buffaloes, antelopes, apes and monk
tygers, are natives of Bengal. The f
and slender, the hare and deer very in
of Europe, and the venison in gener
sipid. The dogs are generally of t
with sharp erect ears and pointed
found in the eastern districts an unde
called the gyal, which may be *plac*
domestic bull and the buffaloe. *The*

rn, abounds in the isles of the Ganges. But
al tyger of Bengal, is most of all worthy of
lar notice; it seems to have been known to
mans, and is distinguished by Seneca the poet
appellation of *Gangetica tigris.* This animal
times five or six feet in height, of such enor-
trength as to carry off a large bullock, and able
r a hundred feet at one spring. The horses,
used in Bengal by the Grandees and Euro-
are of the Persian or Arabian breed, and are
ed at an immense value. The native horses
n, ugly, and ill shaped animals, tolerably ac-
ut, in their best state, not equal to the Welsh
lighland ponies. Bengal is more defective in
ed of cattle, than most other parts of India.
astures are overstocked; and the black cattle
gs are barely kept alive: herds of the former
ften be seen in such a starved state, that not
f them would weigh against a good English
The goats and sheep thrive better; but the
are very small, of a lank figure, black or dark
olour, with coarse, thin, and hairy wool.
ne, poultry, and water fowl of all descriptions,
und in the greatest abundance in Bengal.
, particularly, are here in great variety and ex-
e; and the common domestic fowl of Europe,
ld in the woods, and are called therefore the
fowl. In consequence of the humanity of the
towards the lower animals, the crow, kite,
and sparrow, hop about the dwellings of the
lese with entire familiarity; and even in the
of the English, pilfer from the dishes of meat,
y are carried from the cook-room to the hall.
ge species of stork, ludicrously termed the
nt, from his erect posture and military strut,
at his ease at the side of the natives, and de-
abundance of toads, lizards, serpents, and in-
Among the feathered tribes, may be particu-
nentioned, the argill or hurgill, a species of
which is very large and ravenous, and which is
great veneration by the Brahmins.
e inland commerce of Bengal is carried on
with Thibet, Agra, and Delhi. The prin-
articles are silks, calicoes, muslins, salt-petre,
, sugar, indigo, gum lac, with a variety of
goods, which pass almost entirely through the
of the company. The exportation of grain
he corn countries, and the importation of salt,
tute the greater part of this trade in the hands
natives. The importation of cotton from the
n provinces, and the exchange of tobacco and
nut, form almost the whole supply of internal
nption. Some part of this merchandize is trans-
by land carriage, which is commonly perform-
oxen, sometimes by the small horses of the
y, and rarely by buffaloes; because though
animals are both stronger and more docile than
they are less easily maintained. The magnifi-
auseways, formerly constructed by the native
s, are now fallen into decay. The country af-
no substantial materials for the formation of
ays; and, except in the neighbourhood of mi-
stations, there are no roads sufficient to admit
se of wheel carriages. These disadvantages,
er, are abundantly compensated by the facility with which internal navigation is conducted. So completely are the various branches of the Ganges and the Burrampooter diffused over the flat country, that scarcely any part of this large province is above twenty-five miles distant from a navigable river. The wood, salt, and provisions of many millions of people, are conveyed along these channels by 30,000 boatmen, who are the most laborious and hardy race in India. "These rivers are in a state of tranquillity, from the time of the change of the monsoon in October to the middle of March, when the *north-westers* begin in the eastern parts of Bengal, and may be expected once in three or four days, until the commencement of the rainy season. These *north-westers* are the most formidable enemies that are met with in the inland navigation, being sudden and violent squalls of wind and rain, and though of no long duration, are often attended with fatal effects if not carefully guarded against; whole fleets of trading boats having been sunk by them almost instantaneously. They are more frequent in the eastern, than in the western part of Bengal; and happen oftener towards the close of the day, than at any other time. As they are indicated some hours before they arrive, by the rising and very singular appearance of the clouds, the traveller has commonly time enough to seek a place of shelter. It is in the great rivers alone, that they are so truly formidable; and that about the latter end of May and beginning of June, when the rivers are much increased in width. "During the long interval between the end of the rainy season and the beginning of the north-westers, one proceeds in security with respect to weather; and has only to observe a common degree of attention to the piloting the boat clear of shallows and stumps of trees." "From the beginning of November to the latter end of May, the usual rate of going *with* the stream is 40 miles in a day of 12 hours; and during the rest of the year from 50 to 70 miles: The current is strongest, while the waters of the inundation are draining off; which happens in part of August and September." "Seventeen or twenty miles a day, according to the ground, and the number of impediments, is the greatest distance that a large *budgerow* can be towed *against* the stream during the fair season; and to accomplish this, the boat must be drawn at the rate of 4½ miles per hour, through the water, for twelve hours." (Rennel's *Memoir, &c.*) The vessels, employed in this navigation, are variously constructed, according to the nature of the rivers on which they are employed; and are of various sizes, from eight to twenty-four oars. Some have cabins 14 feet wide, and proportionably long; and draw from 4 to 5 feet water: the larger boats upon the Ganges carry from 300 to 600 mauns.

Maritime trade.

The maritime trade of Bengal, as far as it is managed by the natives, was never so extensive as the inland. The principal part of it is conveyed by the way of Calcutta, a district of considerable extent, situated upon a navigable river, a little below the most western mouth of the Ganges. From Balasore, which is its principal port, a traffic in rice, cottons, and silks is carried on with the Maldives in exchange for cowries; and with the country of Asam by supplying it with great quantities of salt, receiving in

Bengal. payment, gold, silver, ivory, gum lac, and silk. These two branches of maritime commerce have been entirely abandoned to the natives, for particular reasons; namely, the fatality of the climate of the Maldives to Europeans, and the regulations of the sovereign of Asam, restricting the right of importation into his dominions solely to the Bengalese.

A very considerable branch of trade is carried on by the Europeans in Bengal, in furnishing the rest of India with opium, which is produced in Patna, on the upper Ganges, in greater abundance than in any other part of the world, and which is exported in an unprepared state, scarcely possessing the tenth part of the virtue of purified opium. Rice is exported to Ceylon, cottons to Malabar, and silk to Surat; from which is usually brought, in return, a considerable quantity of raw cotton, to be employed in the Bengal manufactures. Rice, gum lac, and cottons, are sent to Bassora, receiving in exchange, dried fruits, rose water, and gold; rice and sugar, to the coast of Coromandel, generally paid for with specie; a variety of rich merchandise to Arabia, receiving in return gold and silver. These branches of trade, though passing chiefly through the hands of Europeans, and carried on under their protection, are not always solely on their account, but frequently in conjunction with Gentoo, and especially Armenian merchants, great numbers of whom, since the revolutions in Persia, have settled upon the banks of the Ganges.

The principal manufactures and articles of trade which Bengal could furnish to the merchant in great abundance and perfection, are cotton piece goods of various descriptions; calicoes, a name applied to several kinds of cloth, to which no English names have yet been affixed; pack-thread, woven into sack-cloth, and employed as clothing by the mountaineers; cotton canvass, flannel, and blankets; dimities of various kinds and patterns, and cloths resembling diaper and damask-linen; wove silk taffeta, plain and flowered; tissues, brocades, plain and ornamented gauzes; a mixed cloth of silk and cotton; filature silk, and tessa or wild silk; grain, sugar, tobacco, indigo, saltpetre, hides, gums, liquorice, ginger, and a great variety of medicinal and dyeing drugs. The articles which are most in demand in Bengal, are japan copper, tin, lead, pewter, sandal and sapan wood, all kinds of spices, and a variety of European commodities.

Cities. Bengal and its dependencies contain five large, and as many smaller cities; forty large towns, and a great number of smaller but not inconsiderable towns; the chief of which are mentioned in the common maps of the country, and need not be enumerated here.

Population. From the want of public registers, the amount of the population in the provinces of India cannot be very exactly ascertained; but various calculations, formed on different data, coincide in estimating the inhabitants of this presidency at more than thirty millions, of which Bengal Proper may be allowed to contain more than one-half. From the fertility of the soil, and the slender vegetable diet required by the natives, it has been computed, that on the same quantity of land in Bengal might be maintained four times the number of people that can be done in Great Britain; and that this province, if
fully into a state of cultivation, could sup
than double its present number of inhabit
this population, about four-fifths consist of n
doos, and the remainder of Moguls. Th
are the descendants of those, who reduced
empire of Hindostan about three centuries
were originally natives of Tartary. In t
districts of Bengal they are nearly as numer
Hindoos. They are of an olive colour, wit
resembling the European. They are all M
dans, and hold the idolatry of the Hindoos i
abhorrence, that, even under the protecti
East India Company, there are frequently ve
feuds between these two classes of subjec
Hindoos are slender, handsome, and well
sembling Europeans in stature, of a dark b
lour, and sometimes a yellowish complexion,
black and uncurled. Most of them shave the
eradicate the hair from every part of thei
and go almost naked, with only a piece of li
their middle; but those of a higher rank
tomed to wear turbans, and a dress of whit
which reaches from the shoulders to the fe
dress of the women consists of drawers, a l
and a piece of cotton cloth thrown over the
Their head is uncovered, and their hair fa
behind. They are fond of loading every pa
body, their hair, arms, legs, fingers, toes,
nostrils, with all kinds of ornaments.

Four different European nations have for
blishments in Bengal for commercial purp
the English, French, Dutch, and Danes.
nish settlement, Serampore, extends about
on the eastern banks of the Ganges, and is
considerable breadth; but, though a small
is of considerable value to the northern cou
is completely surrounded by the British d
has no fortifications except a small batte
luting; and, on the late dispute with the
powers, a party of Seapoys took possession of
the least resistance. The French settlement
demagore, and the Dutch one of Chinsura,
extensive than the Danish; but, from the
tablishments kept up, have never been equa
tageous, and have always cost more than
produced. When the East India Compa
priated to themselves the opium and salt-pe
to prevent any competition in the market, th
to allow a certain quantity annually to t
French, and Dutch, at a specific price, on
that they should not purchase any from th
These treaties, however, were not renewed
French and Dutch, on the late peace;
seem to have considered the surrender of th
ments, without that advantage, as a very us
The English established a commercial i
with Bengal at a very early period; and m
tlement on the river Ganges in the beginni
17th century. Their first factory was at
of Hoogly; but in 1689 it was removed to
which is about 26 miles farther down the ri
means of their fort and garrison, they
from the demands of the rajas, their tradi
which came down from Patna; but in the

18th century, they obtained from Feroksere,
grandson of Aurung-zebe, a firman or grant,
ting their trade from all duties; and, while the
ny stood in need of protection against the native
s, this was regarded as their commercial char-
India. From the year 1742, they had frequent
on to resist, by force of arms, the attacks of the
tta states, and of the nabobs of Bengal, till the
s battle of Plassey, in 1757, laid the founda-
f their great power in that country. From that
they became the arbiters of the succession to
bobship of Bengal; and in 1765 assumed the
ment of that province, receiving from the no-
Mogul, Shah Aulem, a grant of the revenues
gal, Bahar, and Orissa, on condition of paying
ks of rupees (about £260,000) per annum.
this last date, Bengal, with its dependencies,
continued, without interruption, under the
of Great Britain; and, whatever diversity of
n may exist, respecting the means by which
ower was established, there can be no question,
has proved a most beneficial exchange to the
s. In all these provinces, the limits of order
niformly extended with the progress of Euro-
lominion; for the space of half a century, (a
stance unexampled in their history,) the cala-
of war and of military depredation have been
ed from their habitations; and they have en-
a degree of security in their persons and pro-
, at present unknown in any other part of

other particulars, respecting the civil history
ngal, its commercial connections with Great
, its government and revenues, the religion,
ge, manners and customs of its inhabitants, we
ur readers to the articles, INDIA, HINDOSTAN,
INDIA COMPANY, CALCUTTA, DACCA, GAN-
ENTOOS, HINDOOS, SEIKS, BRAHMINS, &c.
odern *Univ. Hist.* vol. vi. Rennel's *Memoir*
Map of Hindostan. Pinkerton's *Geography.*
nt's *Indian Recreations; Thoughts on India;*
ks on the Husbandry, &c. of Bengal. Valen-
ravels, vol. i. Pennant's *View of Hindostan.*
Researches, vol. x. (*q*)

NGAL STRIPES, known also by the appella-
Ginghams, is one of the numerous varieties of
otton manufacture which have been derived
ndian sources, and recently cultivated to very
xtent in Britain. A very near relative of the
of this article, was the first person who manu-
d them to any extent, for the purpose of sale
tland; and their introduction in Lancashire,
they have been carried to a prodigious height,
more recent. The Bengal or gingham, is a
but generally rather fine fabric, of coloured
cotton; and these stripes are sometimes cros-
th either similar or dissimilar stripes, by the
so as to form a check. The fabric of the Ben-
pes is generally designed to assimilate it to the
kinds of printed cottons used for women's ap-
A kind of a much denser fabric, and generally
ch larger patterns, is also manufactured for
gs of beds, window curtains, sofa and chair
and other kinds of domestic furniture. A
part of their excellence, when well manufactured, consists in strength of fabric and brilliancy of colour. Of the fabric, as it was first practised in Scotland, a very near idea may be had by taking about No. 32 for a 1200 reed, and, in this dense fabric, taking the proportion already stated, (as the squares of the reeds, so are the numbers of the warp,) the deviation from actual practice will not be great. The great expense of the Turkey red dye, which is the most prevalent colour, renders this article very expensive when the dyed warp is bold and coarse; and this circumstance has occasioned a very great falling off in the quality of these stuffs. The first expedient generally practised, is to make the coloured warp very considerably finer than the white; for, as the price of the dye, which is charged by the weight, greatly exceeds the original cost of the yarn, it becomes a great object in point of price, to save as much as possible in this respect. But, when the coloured warp is very disproportionally finer than the general body of the texture, besides the deterioration which the general fabric sustains, the brilliancy of the colour is inevitably lost; for the dyed warp is so sunk and concealed in the density of the general fabric, as only to produce a very faint effect. The whole fabric, particularly in the Lancashire goods, is sometimes also made extremely flimsy, and the defect is concealed from the superficial and ignorant observer, by the mode of dressing and finishing the goods, so as to give them an appearance of at least tolerable density of fabric; but the illusion is completely dissipated by the first wetting to which they are afterwards exposed. This mode of finishing consists merely in starching the cloth when bleached with a very thick mucilage, which completely insinuates itself into every vacancy between the threads; and then either dressing it with the paper or pasteboard cylinders, which will be described in the article CALENDER, or giving it high glazing with wax and the flint, as also described in the same article. In this state, when stiffened with the mucilage and well smoothed, it has a beautiful and glossy appearance; and really, in some respect, resembles the appearance of a sheet of well made writing paper; but whenever the starch, with which every part is fully saturated and impregnated, is dissolved by moisture, the thinness and poverty of the fabric is fully detected. The stripes which are made for furniture, requiring greater strength than those for garments, are more dense and close in the fabric than the others. If No. 24 of cotton yarn be taken for a 1200 reed, and other fabrics calculated by the same analogy as the former, something very near what takes place in common practice will be found. In the latter article, the colouring of the stripes is generally much heightened, by making that part of the texture of tweeled, instead of plain cloth. As the fast colours, such as purple, claret, Turkey red, blue, and buff, are generally employed, the fabric, if less susceptible of great ornamental variety than printed cloths, is generally very superior in the greater requisites of brilliancy and durability; and hence it is in higher estimation with those who study economy, and prefer durability to show. In an economical comparison with prints, among other advantages which loom woven stripes possess, is their being totally free from the excise duty of three-pence

Bengal Stripes.

halfpenny per square yard, which attaches to the former; and, in coarse articles, forms a very heavy tax, being often above 20 per cent. *ad valorem*. (J. D.)

BENGO, a town of Africa, in the kingdom of Angola, and the capital of a province of the same name, situated on the river Bengo, and stretching along the west coast. This province was conquered by the Portuguese, who have cultivated considerable tracts of ground, which produce maize and manioc root in great quantities. Banana and bacova trees also abound in this province. See Dapper's *Description de l'Afrique*. (*j*)

BENGUELA, a province of Angola, in Africa, stretching along the coast, the limits of which have not been accurately ascertained by geographers. This province was formerly governed by its own kings; but the incursions of the barbarous Giagas laid waste the country; and the protection of the Portuguese, who have built several forts along the coast, has not been able to restore it to its former importance. Near the Bay of Cows a great quantity of corn and beans are raised, and the inhabitants rear cattle of the best kind in great numbers. In the same part of the country, they gather a kind of odoriferous wood, called *kakongo*, which is held in high estimation. According to Marteniere, there are near the same bay excellent mines of copper. Another traveller maintains, that there are silver mines in the mountains, which have not yet been wrought.

The principal towns of Benguela are Old Benguela, situated upon a mountain; St Philip, or New Benguela; Mankikendo, and Kuschil. The chief rivers are Nika, St Francisco, Moreno, Farsa, Kuneni, and Canton-Belle. According to Dapper, the water of the last of these rivers is of a saline nature, and is collected into pits by the natives for the purpose of manufacturing salt. The mouth of this river, which is sheltered from the winds, is about sixteen feet deep. To the north of this river, the sea forms a gulf which is called Good Bay by the Dutch, on account of its being an excellent watering-place. The climate of Benguela is very insalubrious. The mountainous districts swarm with wild beasts of various kinds. See Dapper's *Description de l'Afrique*. (H)

BENIN, sometimes called GREAT BENIN, the most extensive kingdom in Guinea, is bounded on the north by Gago, Nigritia, and a chain of mountains; on the south by the Gulf of Guinea; on the west by the kingdom of Ardra; and on the east by Mujak and Istanna. Its principal river, the Formosa, divides itself into several branches, some of which are large and navigable streams. The banks of these streams are inhabited by various nations, governed by their respective kings, all of whom, except the sovereign of Awerri, are the slaves of the king of Benin.

Though this kingdom be extremely populous, its towns, or rather villages, are very distant from each other, not only in the interior, but also on the banks of the river, and on the coast. Next to the capital, its principal towns are Bododa, Arebo, Agatton, and Meiberg, situated on the banks of the Formosa, and inhabited chiefly by Dutch colonists, who carry on a considerable traffic.

The country of Benin is low and flat, much covered with wood, and intersected in many pl rivers and small lakes. In some parts of it, particularly on the road from Agatton to there is no water to be found. Yet even tl and plants grow to great perfection; and t country between Agatton and Formosa is with orange and lemon trees. Cotton is abundant production of this country, and principal article of dress. Pepper, likewis here, though neither in such quantities no perfection as in India. Two sorts of wine use of in Benin, called wine of Pali, and win don; the first of which is drunk in the m at noon, and the latter in the evening. Jas are almost the only mineral production of t try mentioned by travellers. Though on richest kingdoms in Guinea, Benin contain any gold-dust, which is found in almost ev part of the western coast of Africa. It however, abound in fish of almost every are particularly celebrated for a species of b which forms a lucrative branch of trade. drupeds of this country are elephants, ty pards, wild boars, civet cats, mountain cat hares, and sheep with fleeces of hair. Its birds are parroquets, pigeons, partridges, st ostriches. Crocodiles, sea-horses, and a species of torpedo, swarm in the rivers.

The climate of Benin, though somewhat is in general unwholesome. The pleasante ther the most tolerable, season is in the m August and September; for then the air is by frequent rains. Tremendous thunders a nings prevail during the months of June a But the most noxious season is in the month tober, November, and December; when th intolerable, and the country is perpetually e in thick pestilential fogs.

One of the most prominent features in th ter of the inhabitants of Benin, is their frie benevolent disposition. They are extreme teous and hospitable to strangers; and are so not to be outdone in generosity, that when a pean gives any of them a present, they nev repay it two fold. Nor are they less attenti comfort of their indigent countrymen. T many institutions, which breathe the purest humanity. The king, the viceroys, and the give subsistence to the poor in the towns of spective residence, by employing in various offi whom their age and health enable to work, a taining gratuitously the aged and infirm. Th individual in the kingdom of Benin is allowe in want, and beggary is altogether unkno dolence is another characteristic dispositio natives of Benin. Only those whom pove pels to work will submit to any kind of bour. The rest devolve upon their wo slaves, the toil of cultivating the ground, and tice of the few arts with which they are ac The ladies of Benin, therefore, not only pre cotton, and manufacture it into cloth, but ployed as blacksmiths, carpenters, and tanners workmanship is extremely rude; but this is peachment rather upon their means, perh arranged, and in the other five columns, all the various interpretations of those words to be found in the Chaldee, Syriac, Vulgate, Latin, and Septuagint, as well as in Aquila, Symmachus, and Theodosian. At the same time, he had compiled for his own private use another volume in quarto, containing all the various readings and emendations of the Hebrew text, collated from these ancient versions. In 1681 he left the university, and taught a school at Spalding. Soon after he was chosen as preceptor to the son of Dr Stillingfleet, dean of St Paul's, who appointed him likewise to be his domestic chaplain. The first work which he published, was a Latin epistle to Dr John Mill, containing critical observations on the chronicon of Malala, the Greek historiographer. This work appeared in 1691; and about the same time, he had the honour of being appointed as the first person to preach the lecture founded by Mr Boyle, for the vindication of the fundamental principles of natural and revealed religion. The sermons which he delivered in this capacity, were published at the desire of the respectable trustees to whom he owed his appointment, and contain the best confutation of the absurdities of atheism ever given to the world. Literary honours, accompanied with more substantial advantages, now began to crowd upon him. In December 1693, he was appointed keeper of the Royal Library at St James's; and such was his zeal and activity in this new situation, that before his patent was signed, he had enriched the library with about a thousand volumes due to it, in virtue of a neglected act of Parliament, which directs, that one copy of every book printed in England should be presented to St James's, and to each university. Soon after his nomination to this office, he became involved in a controversy, which, though trivial in itself, derived considerable importance from the character of the parties by whom it was carried on, and attracted for a long time the attention of the literary world. The honourable Charles Boyle applied to Dr Bentley, by means of a London bookseller, for a manuscript copy of the Epistle of Phalaris, which he intended to publish. It was obtained after much solicitation and many delays, and had not been above six days in the hands of Mr Boyle, when it was re-demanded by the Doctor, with some expressions of contempt both for the work and the editor. This insult was resented by Mr Boyle in his preface to Phalaris; Bentley in return, wrote a dissertation on the Epistles of Themistocles, Socrates, Euripides, Phalaris, and the fables of Æsop, maintaining, and indeed proving in the most satisfactory manner, that the epistles ascribed to Phalaris are spurious, and that Mr Boyle, by a very bad edition, had only rendered them more contemptible. Boyle retorted; a warm contest ensued; the literati ranged themselves under the standards of the different combatants; all the artillery of wit and learning was played off on both sides; till, as usually happens in such controversies, the immediate subject in dispute was relinquished for ill-natured sarcasm, and personal invective. Bentley was unfortunate in having all the contemporary wits, by whom he was dreaded, as his avowed enemies; but when the heat of irritation passed off, it was almost universally agreed, that he had the decided advantage over his antagonist in erudition and argument, and was but little inferior to him in refined raillery, and pointed wit. He was not so much occupied by this squabble, as not to find some leisure for his favourite employment of collating and commenting upon the classics. At the earnest request of his friend Grævius, he drew up animadversions and remarks on Callimachus, with a collection of some scattered pieces and fragments of that poet, which were published by Grævius on the continent in 1697. In 1700, he was made master of Trinity College, Cambridge, an office worth about £1000 a-year; and soon after was collated Archdeacon of Ely. He was now placed in the situation of all others most suited to his habits and his wishes, and engaged, with new ardour, in the exercise of illustrating the classics. The two first comedies of Aristophanes, with his annotations, were published at Amsterdam in 1710; and about the same time, the fragments of Menander and Philemon appeared at Rheims, with his comments and emendations, under the feigned name of *Phileleutherus Lipsiensis*; a character which he again assumed in his attack upon Collins's Discourse on Freethinking. The most important of his critical performances, however, is his celebrated edition of Horace, which was published in 1711; and is pronounced by Dr Hare to be the completest work produced by criticism since the restoration of learning. In 1716, he was appointed Regius Professor of Divinity in Cambridge; and in the same year, circulated proposals for a new edition of the Greek Testament, with St Jerome's Latin version. Few men could seem better qualified for such an undertaking. The greater part of his life had been spent in the critical study of the learned languages, with which he was most profoundly acquainted. His professional situation afforded him all the facilities which could be enjoyed in Britain; he had sent his nephew, Dr Thomas Bentley, in search of every manuscript which could be obtained on the continent; and was actually in possession of twenty different manuscripts, when his proposals appeared. They were received in the most flattering manner by [illegible] true lovers of learning; till Dr Conyers Middleton, always an inveterate enemy to Bentley, published remarks, paragraph by paragraph, upon his proposals, endeavouring to prove that he possessed neither the talents nor materials requisite for the undertaking. These animadversions chagrined Dr Bentley [illegible] much, that he determined the work should not appear during his lifetime; and the subscription money which he had received, amounting to about £2000, was immediately refunded to the subscribers. The last twenty years of his life were spent in a state of dignified ease. His only productions during all that time, were his editions of *Terence*, *Phædrus*, and *Milton*. His peace was considerably interrupted, however, at one period, by a quarrel in which he was engaged with the members of the college over which he presided. By reforming some abuses which had long existed, and curtailing salaries for which little was performed, he provoked those who thought themselves aggrieved, to enter a complaint, accompanied by a proposal for his removal, to the bishop of Ely, as visitor of the college. This gave rise to the question, whether the visitorial power belonged [illegible] the bishop of Ely or the crown? After a long lawsuit, it was determined in favour of the crown; and though, in the present case, interference was declined, Dr Bentley was left in possession of his office. He again, however, excited a clamour against himself, for which there seems to have been more plausible grounds. Upon the creation, by royal mandate, of some doctors in divinity, he demanded from each a fee of four guineas, in addition to the customary perquisite. Here, as on every occasion, Dr Middleton was his most strenuous opponent; and although the graduates at first acquiesced in the demand, a decree was afterwards obtained for the repayment of the money; Bentley was arrested, and appeared by his proctor before the court of the vice-chancellor. It was declared by the beadle, on oath, that Dr Bentley had said, he would not be concluded by what the vice-chancellor and two or three of his friends should determine over a bottle; for which expression he was suspended by the vice-chancellor, without a hearing, from all his degrees; and afterwards, by a vote of the body, deprived of all his privileges, honours, and degrees in the university. In this perplexity he appealed to the king; and at length, after several references to the Council and the Court of King's Bench, and many delays, a *mandamus* was sent to the university, reversing all their proceedings, and directing, that Dr Bentley should be restored to all the degrees, honours, and privileges of which he had been deprived. Of these he continued in quiet possession for twenty-four years after this decision; and died, on the 14th of July 1742, in the eighty-first year of his age. He was buried in Trinity College chapel, by the side of the altar table, "where a square black stone records his name, and nothing more."

Detraction, we are told, is the tax which merit pays to envy; and never was that tax more heavily imposed than in the case of Dr Bentley. Superior in learning to all his cotemporaries, and scarcely inferior to any of them in acuteness and ingenuity, few could stand before him in the fair and open field of controversy. His antagonists, therefore, endeavoured to break the force of his attacks, by degrading his character,—decrying his erudition as scholastic lumber, and charging him with the arrogance of a bashaw, and the ferocity of a savage, because he despised their blunders and their ignorance, and unsparingly detected and censured their absurdities. Hence he has generally been regarded as a man of an irritable and overbearing temper; but if we may credit the testimony of one who had the best access to know him, the affections of his heart were no less gentle and amiable, than his talents were extraordinary and commanding. See Cumberland's *Memoirs, ad initium; Biographia Britannica*, &c. (μ)

BENYOWSKY, Count, the name of a Hungarian adventurer, who has been more praised than he deserves. The early part of his life was occupied in plots, conspiracies, and escapes, and in his better days, we find him in the service of France forming a settlement in Madagascar, and afterwards offering his aid, or rather his treachery, to several of the sovereigns of Europe. We are concerned to find that the life and history of such a man has been thought worthy of preservation. His abilities may have been brilliant, and his bravery undaunted; but he who was an outlaw from his native country, who could shine only in intrigues and conspiracies, and who could offer the power of his sword to the highest bidder, is a man whom posterity is under no obligations to remember. A soldier who fights for his native country, even in the worst cause, is a character which every person must revere. But the renegadoe, who wanders about in search of employment for his sword, and is willing to draw it against any foe, is a murderer by profession, who plunders without an object, and slays without a provocation. Such a man was Benyowsky, and such a man it is impossible to admire.

Those who wish to know more of him, may consult "The *Memoirs and Travels of* Count Benyowsky, *written by himself*, 2 vols. 4to, 1790. (β)

BENZOIN. See Chemistry and Materia Medica.

BERAR, a soubah or kingdom of Hindostan, which now forms the eastern division of the Mahratta empire. It is bounded on the north by Allahabad and Maliva, on the east by Orissa, on the south by Golconda, and on the west by Dowlatabad and Candish. Part of this province belongs to Nizam Ali, Soubah of the Decan. Wheat, rice, poppies, &c. are produced here in great abundance; and in the south of Berar are found the deer that yield the bezoar stone. Berar is divided into thirteen circars, and forty-two pergunnahs, and Nagpour is the capital. Its annual revenue, in the time of Aureng-zebe, was fifty-five krores of dams, or £1,718,750 sterling. See Fraser's *History of Nadir Shah*, p. 26. (*j*)

BERBERIS, a genus of plants of the class Hexandria, and order Monogynia. See Botany. (*w*)

BERBICE, the name of a river of South America, in the province of Guiana, which runs from south to north, and discharges itself into the Atlantic Ocean. It is chiefly remarkable for an extensive settlement formed upon its banks, in the beginning of the seventeenth century, by a Dutch colony.

The river itself is about a mile and a half broad at its mouth, where it is divided into two channels by an island, called Crab Island, about two miles in circumference. Owing to a bar of sand about five miles from its mouth, and stretching from east to west, the navigation is both difficult and dangerous. On this account, all vessels drawing more than four feet of water, are obliged to anchor at the port of Demerary, from which their cargo is carried to Berbice in colony schooners, that are again employed in conveying to Demerary the produce of the settlement. The colony of Berbice was founded in the year 1626, by Van Peer of Flushing, who sent out several ships to trade with the Indians. The colony had flourished to such a degree, that the French, who made a descent upon the coast, were able to extort a contribution of 20,000 florins. In 1678, the settlement was granted, as an hereditary fief, to the family of Van Peer. In consequence of another attack made upon the colony by a flotilla of French privateers, a contribution of 300,000 florins was paid for the safety of the settlement. This sum was discharged by the house of Van Hoorn and Company, who received in

Berbice.

return three-fourths of the [illegible]. The new proprietors of this colony were permitted, by the Dutch East India Company, to import 240 negroes annually from Africa at the rate of 163 florins a head; and the Company became bound to furnish them with a greater number, if it were necessary, at the rate of [illegible] florins each. They were also allowed to dispose of their [illegible] and to levy a duty of 300 [illegible] that came to the colony. By [illegible] of sugar, cocoa, and in[illegible]; many fruitless searches [illegible]; and settlers were invited to [illegible].

[illegible] the colony arise from a capitation [illegible] inhabitants; an excise on every fifty [illegible] sugar that is made; a weighage toll of two [illegible] all exports and imports; and a duty of [illegible] per last on the tonnage of ships. The [illegible] goods are the same as those carried to the [illegible] of the West Indies; and the exports are [illegible] coffee, cocoa, tobacco, a dyeing stuff called [illegible], but chiefly sugar, all of which are obtained [illegible] nearly an hundred plantations, formed on the [illegible] of the river.

In consequence of the dampness and marshiness of the coast, the early settlers built a town and fortress, called Zealandica, fifty miles up the river. The increase of the colony, however, and the difficulty of navigating the river, induced the settlers to build the town of New Amsterdam on the south side of the river Canje, or Conya, where it discharges itself into the mouth of the Berbice. The houses extend up the banks of the latter river about a mile and a half. Each house, with a quarter of an acre of land annexed to it, is surrounded by a trench, which is filled and emptied at every tide. The houses are a story high, and are very long and narrow, with galleries on both sides to afford a shelter from the sun. They are generally thatched with troolie and plantain leaves for the sake of coolness, but the quantity of vermin which is harboured in this kind of thatch, has induced the English settlers to employ shingles. The government-house and the buildings annexed to it are of brick, and are remarkable for their splendour and magnificence. The entrance of the river is guarded on the east side by fort St Andrew and a small battery, while the York redoubt defends it from the opposite bank. The colonial government propose to fortify Crab Island; but this is a matter of no importance, as Berbice must always fall along with the contiguous colony of Demarary. The west banks of the river were first cultivated; but, in 1799, the country, as far to the east of the river as the Devil's Creek, was rapidly cleared of its wood, and became an extensive cotton plantation. The lands on the banks of the river Canje have also been put into a state of cultivation, and produce sugar, coffee, and plantains. This river is navigable for colony schooners for about 50 miles from its embouchure, and is remarkable for immense falls and cataracts near its source. About 40 miles below its head, there is a creek connected with the river Courantine, by which overland dispatches have been brought from Surinam by the Indians.

In the year 1796, Berbice capitulated to th
lish, who reinstated in his office the former g
Van Batenburg. In 1799, when Surinam su
ed to the British arms, the governor of Berb
tered into a negociation with Governor Frede
which Surinam ceded to Berbice the tract
between the Courantine and the Devil's Creek
was speedily put into a state of cultivation.
peace of Amiens, Berbice, along with Demar
restored to the Dutch government. The
which were sent to protect the colony suffer
distress from the want of proper food and ac
dation, and all their applications for redress w
regarded. A mutiny was thus occasioned,
could not be quelled without the assistance o
from Demerary and Surinam. After the m
had surrendered themselves to the governme
bice surrendered to the British under Genera
field and Sir Samuel Hood, in September 18
which time it has continued in our possession.

The population of Berbice amounts at pre
43,500; of whom 1000 are free people of
2500 are whites, and the rest are negroes, the
of whom is doubled within the last ten year
colony of Berbice was bounded on the east
Devil's Creek till the year 1799, when its ea
mits were extended to the river Courantine.
separated, on the west, from the colony of D
by Abarry creek. The breadth of the sett
from the mouth of the river Courantine, is a
geographical miles; its former breadth bei
about 30. New Amsterdam is about 52 mile
south-east by east of Stabroek, the capital of
rary. West Long. 57° 20′, North Lat. 6° 2

BERCHTOLSGADEN, **Berchtesga**
Bergtolsgaden, a town in the principality
same name in the Austrian empire, containing
pulation of 3000. The inhabitants are chie
ployed in the manufacture of ivory, bone, and
toys, which they sell to the merchants of Nure
and in the retail of salt to the surrounding c
The principality of Berchtolsgaden, along wi
of Salzbourg, form a separate province of th
trian empire, which lies between the parallels
gitude 32° 20′ 15″ and 33° 50′ 15″ east, and b
the parallels of latitude 46° 55′ and 47° 50′
It contains a superficies of 181 geographical
miles, and supports a population of 216,0
210,018 according to Hassel. The salt prod
Berchtolsgaden alone amounts, in one year, to
quintals. There are in this province six to
twenty-five villages, of which Salzbourg, Hall
Berchtolsgaden, are the chief. The statisti
count of the province of Salzbourg and Berch
den, comprehending an account of the salt min
which it is enriched, will be given with more
ty under the article Salzbourg. See *Table*
tistique de la Monarchie Autrichienne, par M
moud et Roth, Paris, 1809; *Geographie et Sta*
de toute la Monarchie Autrichienne, par K.
merdoerfer, Leipz. 1793; and *Hist. et Mem.*
Societé des Sciences Physiques de Lausanne,
1788, tom. iii. (w)

BERDOA, an extensive province of Africa

ling the towns of Berdoa, Fobabo, Arna, and
, and situated to the south of the desert of
(j)

ENICE's Hair, the name of one of the
ations in the northern hemisphere, containing
erlin catalogue 48 stars; in that of Flamstead
that of Hevelius 21; and in that of Tycho
e Astronomy, p. 750. (w)

ESOF, or Beresow, a district of Russia, in
vince of Tobolsk, situated between the Ural
ins and the Straits of Waygats. For an ac-
f the gold mines of this district, see Tooke's
Russia, vol. iii. p. 296.; and Ural Moun-
(j)

G, the name of a grand duchy, formerly in
le of Westphalia, but now a separate princi-
ttached to the confederation of the Rhine. It
ntainous though fertile district, and is water-
he Wipper, the Sieg, and the Ruhr. The
roduce corn in abundance, and excellent pas-
while the mountains, covered with extensive
inclose valuable mines of lead, iron, and coal.
and duchy of Berg, as it is constituted at pre-
1811,) contains a superficies of 201 square
nd a population of 610,000. Its military
8000 men, and its annual revenue 2,300,000
See *Aperçu de l'Etat actuel de l'Allemagne*,
Ockham, 1809. (o)

GAMO, the *Bergomum* of the ancients, is a
Italy, formerly the capital of the district of
asco, but now of the department of Serio,
tified, and situated on several hills between
mbo and the Serio. Bergamo contains thir-
ish churches, and twenty-two convents. It
on a considerable commerce in woollen and
tuffs; and its serges and tapestry have been
high estimation. A communication below
connects the city with the castle upon the
he cathedral is a large building. A well fre-
fair is held here on St Bartholomew's day,
building used on this occasion is the most
ble thing in Bergamo. The gates of this
e regularly shut at a fixed hour, as if the
were the seat of war. The population is ge-
reckoned at 30,000; but Chantreaux makes
20,000. East Long. 9° 45′, and North Lat.
(j)

GEN, or Berghen, the largest town in Nor-
d the capital of the province of Bergenhuys,
aport town built in the form of a crescent
gulf of the sea, which forms one of the finest
s in Europe, defended by seven lofty moun-
nd by several fortifications; but particularly
Fredericksburg. Though all the public build-
d several private houses be built of stone, yet
ter part of the buildings are of wood. The
he cathedral, school, and some parish churches,
principal public edifices. The imports of
are chiefly corn and foreign goods, and its
are hides, timber, fish, fish oil, and tallow.
rchants of the Hanseatic league attempted to
lise the trade of Bergen, and to exclude even
inhabitants; but in consequence of the vigo-
position made by Walkendorf, this monopoly
was destroyed, and the the merchants expelled from the place. Bergen suffered dreadful losses by fire in the years 1428, 1623, 1640, 1702, 1756, and 1771, in the last of which, the reflected light of the conflagration is said to have been seen in the Shetland isles. Population in 1769, 13,735, and in 1799, 16,000, according to Catteau. In 1768, the exports of Bergen were 695,760 risdales, and 75 schellings, and its imports 421,754 risdales and 64 schellings. In 1790, it exported 958,000 risdales worth of fish. In 1799, Bergen had 53 vessels above ten lasts. East Long. 5° 33′, North Lat. 60° 23′. See Busching's *Geog.* vol. i. p. 369; and Catteau's *Tableau des Etats Danois*, vol. ii. (Q)

BERGEN, the capital of the isle of Rugen, belonging to Sweden, is situated on a rising ground nearly in the middle of the island. It contains only six stone buildings; the streets are sloping and bad, the lanes dirty, and the houses mean. The town, which is divided into four quarters, and inhabited chiefly by tradesmen and husbandmen, is governed by two burgomasters, two chamberlains, four councilmen, and a secretary, from whom there is an appeal to the court at Griefswald. There are here three fairs annually, at which a considerable quantity of linen and cattle is disposed of. The surrounding soil is high and sandy; but the low grounds are well adapted for the cultivation of corn. Number of houses 3000; population 15,740. (H)

BERGEN op Zoom, a small but beautiful maritime town of Dutch Brabant. It stands on a rising ground in the middle of a morass, on the river Zoom, where it joins the Scheldt, and was defended by regular fortifications in the year 1629, under the direction of the celebrated Cohorn. The church, the market-place, and squares, are large and well built. The subterraneous gallery by which the French entered by surprise, in 1746, and the ravelines of Cohorn, where the breach was made, are still to be seen. East Long. 6° 8′, North Lat. 51° 32′. (j)

BERGERA, a genus of plants of the class Decandria, and order Monogynia. See Botany. (w)

BERGERAC, the largest though not the chief town of the department of Dordogne, in France, divided into two parts by the river Dordogne. In the arrondissement of this town, there are manufactures of paper, besides forges and founderies of cannon. Population 8540. East Long. 0° 37′, North Lat. 44° 51′. (j)

BERGIA, a genus of plants, of the class Decandria, and order Pentagynia. See Botany. (w)

BERGMAN, Torbern, Sir, a celebrated Swedish chemist, was born at Catharineberg, in the province of West Gothland, on the 20th March 1735. His father, who was receiver of finances in the district, destined young Bergman for his successor in office; but the disposition which he began to display, seemed to be hostile to the intentions of his family. His friends, and the whole neighbourhood, were annoyed by his extreme petulance and forwardness. He seized all things that came in his way, and amused himself by throwing them into the fire, and observing the manner in which they were consumed. Neither threats nor punishment could overcome this ific propensity; and to such a degree was it car that when any thing was lost in the vicinity, g Bergman was accused of having burnt it.

Having finished the early part of his education at ra, a place celebrated by its college, he was sent the age of 17 to the university of Upsal, and was iced under the charge of a near relation. The ar- our with which he cultivated the study of mathematics and natural philosophy, was checked by his guarian, and the *Elements of Euclid*, the *Astronomy of Keill*, and the *Principia of Newton*, were among the books prohibited by this enemy of the sciences. But the mind of Bergman could not be restrained by such unworthy fetters; and though he appeared to yield a becoming submission to the will of his relation, he contrived, by means of a drawer concealed under his table, to get possession of his favourite authors, when sleep or absence had disarmed the vigilance of his friend. Being thus compelled to study at those untimely hours, when nature would have prompted him to seek for repose, his body was unable to support the exertions of his mind, and he was obliged to return to Catharineberg to seek the restoration of his health in the bosom of his friends, and in the retirement and exercises of a country life. In consequence of the recovery of his strength, he returned to Upsal in 1754, with the permission of his family, to devote himself wholly to the sciences. The illustrious Linnæus, who then lived at Upsal, was in the zenith of his fame. Encouraged by his example, and aspiring to a portion of his glory, the youth at Upsal sought for distinction in the study of natural history. The ardent mind of Bergman was particularly actuated by this generous impulse. He began his career with the study of entomology; and such was the rapidity of his progress, that he soon attracted the particular notice of Linnæus himself. He made profound researches respecting several species of moths and caterpillars, and upon the tenthredo or saw-flies, that are devoured by the larvæ of ichneumons, which feed upon their entrails, and cover themselves with their envelope. He divided the caterpillars into five species, depending on the disposition of their wings and feet. His observations on bees, and his useful experiments for the purpose of preventing the ravages committed upon fruit trees, by an insect called *phalæna brumalis*, gained him the prize of the royal academy of Stockholm. The method of extirpation, suggested by these experiments, was tried by Mr [illegible] Cronsted, who in a short time, took above [illegible] of the females. His observations on leeches were equally interesting and successful. Linnæus and Muller had observed several species of these animals; but it was reserved for Bergman to observe their [illegible] and throat. He discovered that they were oviparous, and that the *coccus aquaticus* is the egg of the leech, containing 10 or 12 young. Linnæus, to whom Bergman communicated this discovery, at first doubted the fact, but his incredulity was soon changed [illegible]. He exclaimed with enthusiasm, *vidi et obstupui* (I saw and was astonished); and in [illegible] the memoir upon that subject, he wrote these words at the bottom, and transmitted it to the academy of Stockholm with that honourable passport. The esteem which Linnæus felt for Bergman, in consequence of these discoveries, was at th powerfully displayed, by giving his name to one of several new species of moths which he had detected. The other authors who shared this glory with the Swedish naturalist, were Forskal, Reaumur, Solander, Alstroemer, Frisch, Scroeber, Scopoli, and Geoffroy.

Though natural history was the general object of his studies, the attention of Bergman was occasionally directed to other subjects. In 1759, he published, in the *Swedish Transactions*, a review of the different explanations of the rainbow. In 1760 appeared his paper on the origin of meteors, that are not attended with any noise or explosion; and another memoir on the opinion of philosophers respecting the twilight.

For several years, Bergman had given lessons in algebra in place of M. Meldercreutz; and in the year 1761 he was appointed joint professor of mathematics and natural philosophy; a situation which he filled with honour and advantage for the space of five years. He observed the transit of Venus in 1761, with great accuracy. In consequence of a correspondence with Mr Wilson, Bergman wrote on the subject of electricity, in the years 1761 and 1762. He attempted to investigate the circumstances which attended the passage of the electric fluid across water; the effect produced by electricity on the colou of silk ribbands; and the electrical properties of tourmalin and Iceland crystal, which the Academy of Stockholm had referred to his examination. He published, in 1764, four memoirs on the aurora borealis, and attempted to determine the height in the atmosphere where this phenomenon takes place.

The studies of Bergman now received a new direction, in consequence of the resignation of Wallerius, a celebrated professor of chemistry and mineralogy at Upsal. Though chemistry had scarcely occupied his attention, Bergman had the boldness to appear in the list of competitors for this vacant chair. Wallerius, who supported the claims of one of his own pupils, formed against Bergman a powerful party, who represented him as unfit for the office to which he aspired. Bergman saw the strength of their representations, and the influence they might have upon his election; and resolved to oppose them by the most honourable weapons. He shut himself up in his laboratory, and composed a memoir on the preparation of alum, and on the most economical means of procuring it. This paper excited the astonishment both of his friends and his adversaries. The former regarded it as a triumph over the i trigues of his enemies, while the latter endeavoured to reduce and depreciate its merit. Wallerius hi self condescended to attack it in the journals; all these assaults tended only to ensure the su of its author. Gustavus, the Prince Royal, and wards the King of Sweden, who was then chan of the university, procured an accurate statem the dissensions at Upsal, and applied to the Swab and Tiliais, counsellors of the mines, account of the merits of the respective ca Having received the most favourable view character and talents of Bergman, the pri up, in his own handwriting, a reply to all t

against his favourite candidate, and pre-
the senate, who immediately appointed
the chemical chair.

ular to remark, to what accidental circum-
frequently owe the developement of great
atural history and the physical sciences oc-
attention of Bergman till the 32d year of
but for the resignation of Wallerius, or
generous interference of Gustavus, che-
ld have been deprived of those brilliant
which immortalise his name. The duties
office imposed upon him the necessity of
is whole time to chemical pursuits; and he
areer with all the ardour and fearlessness
sm. The public laboratory at Upsal was
and ill arranged when it came into his
t his request, the apartments were repair-
rged. The laboratory of Aurivillius was

His own cabinet of minerals, along with
wab and Wallerius, were arranged in one
according to their chemical composition,
ther according to their geographical si-
In another apartment, he placed accurate
all the articles of chemical apparatus, and
ious instruments used in the arts; and
ted his collection by the purchase of the
cal works on chemistry and the arts.

ese admirable auxiliaries, Bergman entered
rdent career. Exempted from the preju-
eorists, and conducted by the torch of
he began by repeating all the leading ex-
n chemistry; he attended carefully to the
ute circumstances which seemed to affect
; he marked the legitimate conclusions
experiments authorised; and, by thus car-
chemistry the principles of the philosophy
he was rewarded by a variety of the most
scoveries.

ining the carbonic acid, or fixed air, which
had discovered in the composition of al-
calcareous earths, he found that it was a
acid, and called it the aërial acid. By
ugar with nitrous acid, he obtained from it
ng acid, differing from all others in its pe-
ities, and which he also found to exist in
n-arabic, in all the saccharine substances,
several animal products. He discovered
hree new acids, viz. that of molybdena,
ngstein, and that of phosphate of iron.

ct of earths next engaged his attention.
numerous experiments on barytes; he
hat magnesia was not a calcareous sub-
had been generally supposed; and he pro-
ilex differed from all other earths, and par-
om argil.

year 1773, Bergman published a memoir
lization, in which he shewed how the va-
s of crystals could arise from a simple pri-
n, and how this primitive form could be
by the dissection of the crystal. This
theory, of which Bergman has laid the
, has been carried to great perfection by
Hauy, and the Count de Bournon.

analysis of mineral waters he published no
n six dissertations, which Macquer ranks
among his most valuable productions. By employing new re-agents, he gave a high degree of perfection to this kind of analysis. Instead of determining the quantities of the ingredients, by endeavouring to obtain them singly, he endeavoured to find the weight of one of the ingredients when combined with some well-known substance which he employed for this particular purpose. He examined also the composition of aërated and sulphureous waters; and he was the first who pointed out the method of forming artificial mineral waters.

His experiments on tartrate of potash and antimony, conducted him to the same results which had been obtained by Messrs Macquer and Lasonne; and in his analysis of volcanic products, of which numerous and valuable specimens had been brought to Sweden by Messrs Ferber and Troil, he exhibited a particular ingenuity, and detected the various operations of nature in the formation of these interesting substances.

In the analysis of many simple substances, and of several chemical compounds, he employed the blowpipe with singular success. The composition of precious stones had hitherto been unknown, but, in the hands of Bergman, they submitted to an accurate analysis. With the simple apparatus of a blowpipe, a piece of charcoal, a small quantity of soda, and a little borax, he found that alumine, mixed with a portion of silex, of lime, and of iron, was the base of emeralds, sapphire, topaz, hyacinth, and ruby; that the proportional quantity of silex was successively increased in grenat, schorl, tourmaline, zeolite, quartz, and rock crystal; and that gems were partly connected with siliceous stones, and partly with alum.

The researches of Bergman into the composition of metals and metallic oxides; his analysis of nickel and zinc; his explanation of the fulminating property of several oxides of gold; his inquiries respecting crude iron, malleable iron, and steel, in which he shewed, that the various states in which iron appeared was owing to the admixture of phosphate of iron, manganese, and many foreign substances, chiefly metallic; his labours in the mines of West Gothland; his method of forming bricks of a durable nature; his investigations respecting the combination of mercury with muriatic acid; respecting the analysis of calculi and asbestos; and respecting sulphuretted antimonial preparations,—all these various labours can only be mentioned in this short sketch of his life.

The subject of elective attraction, which Geoffroy had begun in 1718, was resumed by Bergman with wonderful success. In order to complete this laborious undertaking, he calculated that no fewer than 30,000 experiments would be necessary; but finding that his health was unfit for such enormous labour, he arranged the materials which he had collected, and published very accurate and extensive tables of elective attractions. These tables were the first that contained the laws of affinities as they are observed in operating by the dry way. He has represented, by formulæ, all the chemical operations, the results of which form the basis of the table; and he has exhibited, at one view, the substances upon which he operated, the method employed, and the result of the operation. In his work on elective attraction, and in that on metallic precipitates, he has explained all the phenomena by the various modifications of the principle of phlogiston; but though the existence of this principle has been completely exploded by the discoveries of Lavoisier, these, and his other works, will long continue to be resorted to by chemists, as the most valuable repositories of chemical facts.

Though the whole of Bergman's life was devoted chiefly to experimental chemistry, and to the discovery of facts, yet he did not scruple to venture into the regions of hypothesis. The combination of loose and unconnected facts by an hypothesis, however arbitrary may be its assumptions, is a great step to a legitimate theory; and, during the last century, has been of immense service to the progress of science. In former ages, when the method of induction was unknown, and when facts were accommodated to preconceived notions, hypothesis was fatal to the progress of discovery; but we have lately seen, what valuable accessions mineralogy has received from the contentions between the Huttonians and Wernerians. The theory of the earth which has been given by Bergman, supposes that the globe was originally a nucleus, probably magnetic, surrounded with a fluid, which held in suspension or solution all the elements of bodies. In consequence of its rotatory motion, the equatorial parts swelled out from its centre: the denser and less soluble materials formed the first elevations upon the nucleus: the saline and metallic substances insinuated themselves into the crevices: the crystallizations were formed and deposited according to their affinities and densities: the waters, condensed towards the poles, became solid masses, constantly increasing; and being thus diminished in volume, they run into the hollows among the mountains that gradually rose from below, and obeyed the force of universal gravitation: the lighter bodies floated on the surface, while others of greater density sunk to the bottom: gases of different kinds were disengaged from the earth, and meteors were generated in the atmosphere.

In 1773, Bergman published a Memoir on the principal characters of earths, which carried off the prize given by the Royal Society of Sciences at Montpellier; and some years afterwards his researches on the analysis of indigo were well received by the Academy of Sciences at Paris.

The short history which we have now given of the discoveries and writings of Bergman, includes the principal events of his life, which was marked by few incidents that can gratify the curiosity of his admirers. He was raised to the dignity of rector of the university of Upsal; and in this important office he maintained peace and tranquillity between the two parties into which the professors were divided.

In the year 1776, the king of Prussia invited Bergman to settle at Berlin among the illustrious characters, with whom that monarch had encircled his throne; but though a regard for his health might have incited him to remove to a warmer climate, yet the kindness which he had received from the King of Sweden prevailed over every personal consideration, and induced him to remain in his native country. The constitution of Bergman was now on the
decline. Palpitations of the heart, and vio
aches, interrupted his labours; and his phy
vised him to abandon all his studies. H
great relief from natural and artificial m
ters; and in the hopes of receiving more
benefit, he went to drink the waters at
1784, but his strength was insufficient f
tigues of the journey, and he expired soo
arrival, on the 8th of July 1784, in the 5
his age.

In estimating the merits of this illustri
sopher, we are not entitled to apply the
which talents are generally measured.
consider only the extent of his labours, an
ber and importance of his discoveries, we
to form the highest opinion of his indust
nius: but when we reflect, that all the
were performed, and all these discoverie
the short space of 17 years, the talents o
shine with new splendour, and we can sc
a place too high for him in the rank of ch
losophers. Had Bergman entered upon th
chemistry at an early age, and prosecuted
gour through the ordinary term of human
a vast accession of new facts would chem
received from his labours, and what a co
station would he have held in the lists of g

During his short life, Bergman was
knight of the royal order of Vasa; a mem
Academy of Sciences at Upsal; an associ
Academy of Sciences at Paris; a fellow of
Society of London, and a member of the
of Berlin, Stockholm, Dijon Montpellier,
Turin, Gottenburg, and Lund; and after
the university of Upsal paid the highest
his memory, and a medal was stuck by or
Academy of Stockholm, to perpetuate t
which they felt for his loss.

In the year 1771, Bergman married
therine Trast, an accomplished and ami
with whom he enjoyed all the happiness o
life but that which arises from a family.
fond of botany and natural history, the stu
Bergman had unwillingly forsaken; and
great pleasure from seeing before him the
insects which she reared, and which had be
jects of his former researches.

The principal works of Bergman are his
Physica et Chemica, pleraque seorsim antea
ab auctore collecta revisa et aucta, 3 vols
1780, 1783. This work was translated
lish by Dr Cullen of Dublin, in 2 vols
notes and illustrations; and also into Fre
Morveau. *Physik Beskrifnung oefoer Jor*
Physical Description of the Earth, in 2
say on the utility of Chemistry, which orig
peared in 1779 in Swedish, and was trans
English in 1783. *Meditationes de System*
lium naturali, published in the *Act. Up*
vol. iv. and translated into English in 1
Primordiis Chemiæ, 1777. *Chemiæ Pr*
medio, Sæc. vii. *ad med.* Sæc. xvii. 1782.
phia Mineralis, Lips. 1782, translated in
by Mongez, and into English by Wither
CHEMISTRY, and SCHEELE. (*o*)

Berkeley.

BERGOO, a country of Africa, lying to the west of Abyssinia, and extending about 187 geographical miles from east to west, and 250 from north to south. Bergoo is governed by a sultan who recruits his army from the inhabitants of eight large mountains, about a day's journey from Wara, the capital of Bergoo. The inhabitants of each of these mountains are said to speak a distinct language from the rest, and to be zealous Mahometans. This people, more humane than some of their neighbours, never make war for the express purpose of carrying off the prisoners or slaves. Though the Bergoos are Mahometans, yet many of their tribes which depend upon them are idolatrous and cruel. They devour the flesh of their prisoners, and preserve parts of their skin as tokens of bravery. See Browne's *Travels*, p. 310. (*j*)

BERKELEY, George, the celebrated and ingenious bishop of Cloyne, in Ireland, was born at Kilcrin, near Thomastown, in the county of Kilkenny, being the eldest son of William Berkley, Esq. a cadet of the noble family of Earl Berkley of Berkley Castle. He received the first rudiments of his education at Kilkenny school, under Dr Hinton, whence Swift had, but a few years before, removed to the university; and was, at the age of fifteen, admitted a pensioner of Trinity College, Dublin, of which he became a fellow, June 9, 1707. He shewed a very early passion for literature; for before he was twenty, he had composed his ingenious mathematical essay, entitled, *Arithmetica absque Algebra aut Euclide demonstrata*, which he published in the same year that he was admitted a fellow of Trinity: and, in 1709, he published his justly celebrated *New Theory of Vision*, in which he establishes the very important conclusion, that magnitude as made known by the touch, is essentially different from magnitude as made known by the eye, of which it is not the direct province to perceive the dimension of solidity, or to discern or judge of the distance of objects. A person born blind, he concludes, would, if suddenly restored to sight, be altogether unable to tell how any object that affected his sight would affect his touch; but would imagine, that all the objects he saw were in his eye, or rather in his mind.

The difference thus exhibited between the notions acquired by two of our senses, probably tended to convince Berkeley, that the objects of our perceptions are mere ideas, quite independent of material substance. In his *Theory of Vision*, however, he goes no farther than to assert, that the objects of sight are nothing but ideas in the mind; not denying, that there is a tangible world which is really external, and which exists whether we perceive it or not. But in his *Principles of Human Knowledge*, which he published in the subsequent year, he, without any ceremony, denies the existence of every kind of matter whatever; nor does he think this conclusion one that need, in any degree, stagger the incredulous. "Some truths there are," says he, "so near and obvious to the mind, that a man need only open his eyes to see them. Such I take this important one to be, that all the choir of heaven, and furniture of earth,—in a word, all those bodies which compose the mighty frame of the world, have not any subsistence without a mind." This deduction, however singular, was readily made from the theory of our perceptions laid down by Descartes and Mr Locke, and at that time generally received in the world. According to that theory, we perceive nothing but ideas which are present in the mind, and which have no dependence whatever upon external things; so that we have no evidence of the existence of any thing external to our own minds. Berkeley appears to have been altogether in earnest in maintaining his scepticism concerning the existence of matter; and the more so, as he conceived this system to be highly favourable to the doctrines of religion, since it removed matter from the world, which had always been the stronghold of the atheists.

Berkeley by no means confined his studies to metaphysics; for, in the year 1712, he published the substance of three sermons, delivered in the college chapel, in support of the doctrine of passive obedience; in consequence of which he was represented as a jacobite, and refused some preferment in the church of Ireland to which he had been recommended. This unfavourable impression, however, was removed by the good offices of Mr Molyneux, by whom Berkeley was introduced to the patronage of the Prince and Princess of Wales, afterwards George II. and Queen Caroline. In the same year, he published, in London, a farther defence of his system of immaterialism, in *Three Dialogues between Hylas and Philonous*. He was at this period the friend of his two ingenious countrymen Swift and Sir Richard Steele; and was beloved and respected by both, though men of the most opposite principles. Through their good offices he became known to the most celebrated wits and learned men of the time; particularly Pope, Arbuthnot, and Addison, with whom he formed an intimacy that terminated only with his life. He was induced, by this intercourse, to become a contributor to the celebrated periodical works the Spectator and Guardian, which he adorned with several pieces highly favourable to virtue and religion.

It was through his friend Swift that he became known to the Earl of Peterborough, who appointed him his chaplain and private secretary, and whom he accompanied to Sicily and Italy in November 1713, in the capacity of ambassador. On returning to England in the ensuing year, he found that his hopes of preferment had expired with the change of administration; which induced him to accept the offer of travelling through Europe with the son of Dr Ashe, bishop of Clogher. At Paris he visited the celebrated Father Malebranche, who was then in a declining state of health, and engaged with him in so keen a metaphysical argument, that an increase of the disorder of Malebranche, which was an inflammation of the lungs, was the consequence. In fact, the learned father died a few days afterwards, viz. October 13, 1715. On his way home, he drew up, at Lyons, a curious tract, *De Motu*, which he transmitted to the Royal Academy of Sciences at Paris, and afterwards published in London in 1721. He was likewise the author of an *Essay towards Preventing the Ruin of Great Britain*, printed in the same year, and occasioned by the disastrous South Sea scheme of 1720.

Upon his return, his acquaintance among the great was considerably extended; and Lord Burlington, who had conceived for him a high esteem when at Rome, on account of his taste for architecture, obtained for him the grant of the deanery of Down, worth £2000 per annum. Through the narrow system of politics, however, which then prevailed in the Irish cabinet, considerable opposition was made to his appointment; and such was Berkeley's mildness and humility, that he could not be prevailed upon to dispute the matter, or even expostulate on the subject. His noble patron afterwards, in 1724, procured for him the deanery of Derry, the next best in Ireland to that of Down, and worth £1100 per annum. Upon this preferment he resigned his fellowship to which he had been appointed in 1717, in which year, also, he had received the degrees of bachelor and doctor in divinity. About this time he obtained an agreeable accession to his income by the death of Mrs Vanhomrigh, the Vanessa of Swift, who made Berkeley one of her executors, and left him half her fortune, amounting to about £4000, although she had been but once in company with him. In his capacity of executor, he committed to the flames several letters that had passed between her and the dean, not, as he expressly declared, because there was any thing criminal in them, but because there was a warmth in the lady's style which he thought it delicate to conceal from the public.

Previous to his appointment to the deanery of Derry, the benevolent mind of Berkeley had been busied in the noble plan of converting the savage Americans to Christianity, by erecting a college in the Bermudas or Summer islands, which might likewise be a seminary for more completely supplying the churches in our foreign plantations. In 1725, he published a proposal for this purpose in London; at the same time offering to resign his lucrative benefice, and to dedicate the remainder of his life to the instruction of youth in America, on the moderate income of £100 per annum. Three junior fellows of Trinity College, Dublin, influenced by this distinguished example of disinterestedness, offered their services in the intended seminary on a salary of £40 yearly, in room of all their prospects at home. After much solicitation and attendance on the great, Berkeley succeeded in having his favourite measure approved by government, and introduced into the House of Commons by Sir Robert Walpole. A charter was granted by his majesty for erecting a college, by the name of St Paul's college, in Bermuda, which was to consist of a president and nine fellows, who were obliged to maintain and educate Indian children at the rate of £10 a year for each. £20,000 was allotted for this philanthropic purpose, of which one half was furnished by the ministers, and the other half was to be afterwards advanced. Berkeley and his associates were permitted to retain their livings in Ireland till this sum should actually be paid; but were bound to resign them in a limited time after the payment should take place. The benevolent dean lost no time in carrying this favourite plan into execution; but, in 1728, passed over to America, having a little before united himself in marriage to the eldest daughter of John Forster, Esq. speaker of the Irish House of Commons. Upon his arrival at Newport, in Rhode Island, he contracted for the purchase of lands on the adjoining continent, and fully expected that the purchase money would, according to agreement, be immediately paid. His expectations, however, were disappointed; and, after various delays and excuses, he was at length informed by Bishop Gibson, in whose diocese, as bishop of London, the whole of the West Indies was included, that upon application to Sir Robert Walpole, he received the following remarkable answer: "If you put this question to me as a minister," said Sir Robert, "I must and can assure you, that the money shall most undoubtedly be paid as soon as suits with public convenience; but if you ask me as a friend, whether Dean Berkeley should continue in America expecting the payment of £10,000, I advise him by all means to return home to Europe, and give up his present expectation." Accordingly the dean, after having expended a great part of his private fortune, and more than seven years of his life, in the prosecution of so laudable a scheme, found himself compelled to return to England. Before he left Rhode Island, he distributed the books he had brought with him among the clergy of that province; and, upon his arrival in London, immediately returned all the private subscriptions that had been advanced for the support of his undertaking.

In 1732 he published the *Minute Philosopher*, a performance which has been very generally read and admired. It consists of a series of dialogues, on the model of Plato, of which it is the object to refute the tenets of the free-thinker, who is here exhibited successively in the various characters of atheist, libertine, enthusiast, scorner, critic, metaphysician, fatalist, and sceptic. At this period he stood high in favour with Queen Caroline, who was a distinguished patroness of men of virtue and talents. Upon a vacancy in the see of Cloyne, in 1733, at the instance of her majesty, Berkeley was appointed to that bishopric, and in May 1734 he was consecrated bishop of Cloyne, and vacated his deanery. On that occasion he said to his intimates, "I will never accept a translation;" a resolution to which he most religiously adhered; for when he was offered the see of Clogher in 1745 by Lord Chesterfield, then lord lieutenant of Ireland, he respectfully declined the promotion, although that see was double in value to the bishopric of Cloyne. In the discharge of his episcopal duties, he was in the highest degree meritorious and exemplary, and was distinguished by his pastoral hospitality, and constant residence. While his health permitted, he was a regular preacher; and always delivered extemporaneous sermons; for it is not known that he ever reduced a single sermon to writing, with the exception of one preached before the society for propagating the gospel in foreign parts, which was published at their request.

About this time he published *The Analyst*, a very ingenious performance, intended to show that there are mysteries or unintelligible principles admitted by mathematicians in their reasonings, and particularly in the doctrine of Fluxions, which might be much more justly objected against than the mysteries of faith, which are often alleged as inadmissible by the enemies of religion. This work originated in the following circumstance: Mr Addison having visited Dr Garth in his last illness, addressed him seriously on the necessity of preparing for his approaching dissolution; to which the Doctor replied, "Surely, Addison, I have good reason not to believe those trifles, since my friend Halley, who has dealt so much in demonstration, has assured me, that the doctrines of Christianity are incomprehensible, and the religion itself an imposture." This conversation being reported by Addison to Berkeley, the bishop wrote *The Analyst*, as a confutation to this redoubtable dealer in demonstration. In 1735, he published *A Defence of Freethinking in Mathematics*, being a reply to Philalethes, supposed to be Dr Jurin, who had opposed the doctrines of the Analyst. In the same year also, he published a small pamphlet on this subject, entitled, *Reasons for not replying to Mr Walton's full Answer*, &c. For some time after this, his attention seems to have been directed to the public affairs of his country; and his *Queries*, for the good of Ireland, published in 1735; his *Discourse addressed to Magistrates*, in 1736; and his *Maxims concerning Patriotism*, in 1750, were a valuable fruit of this application of his mind. In 1745, during the Scottish rebellion, he addressed a letter to the Roman catholics of his diocese; and in 1749, another to the clergy of that persuasion in Ireland, under the title of *A Word to the Wise*, which was so well received by them, that they returned him their public thanks, with expressions of marked esteem and respect, which describe him as "the good man, the polite gentleman, and the true patriot." He has also acquired considerable celebrity as the author of *Siris, a chain of philosophical reflections and enquiries concerning the virtues of Tar water*;" which was reprinted in 1747, and followed in 1752 by *Farther thoughts of Tar water*, the last of his publications. Berkeley thought that he received great benefit from this medicine, in allaying a nervous colic, to which he was subject during the decline of life.

In 1752, he adopted the resolution of removing with his wife and family to Oxford, in order to superintend the education of one of his sons. Entertaining a firm conviction of the obligation of residence upon every clergyman, he endeavoured to exchange his bishopric for some canonry or headship at Oxford; and not having succeeded in this, he requested permission, by a letter to the secretary of state, to resign his bishopric, worth at that time not less than £1400 per annum. When the petition for this purpose was presented to his majesty, he declared that he should die a bishop, in spite of himself; and gave him full liberty to reside wherever he pleased. Before he left Cloyne, however, he directed the rents of his demesne lands, amounting to £200 a-year, to be distributed among the poor. At Oxford he was in the highest degree respected and beloved; but his residence there was destined to be very short. Whilst his lady was reading to him one of Sherlock's sermons on the evening of Sunday, January 14th, 1753, he was suddenly seized with what is called a palsy of the heart, and instantly expired. His remains were interred at Christ Church, Oxford, where a marble monument was erected by his widow, with a Latin inscription by Dr Markham, afterwards archbishop of York. In this inscription, he is said to have been born in 1769; but it is stated in the *Biographia Britannica*, on the authority of his brother, that he was born in 1684, and consequently died at the age of 69.

Berkeley was of a comely figure, a benign and impressive countenance, and of a robust constitution, till his health was impaired by his sedentary habits. Few persons were ever held in higher estimation by those who knew him than this excellent prelate, whose worth was of so high a standard as to render the praise of Pope scarcely hyperbolical, when he ascribes,

> "To Berkeley every virtue under heaven."

Bishop Atterbury, after having been in company with Berkeley for the first time, on being asked his opinion of this excellent person, exclaimed with admiration, "So much understanding, so much knowledge, so much innocence, and such humility, I did not think had been the portion of any but angels, till I saw this gentleman." That the knowledge of Berkeley was greatly diversified, and extended to the arts and business of common life, as well as the depths of science, is amply testified by the author of the *Court of Augustus*, Dr Blackwell, whom the bishop wished to engage as one of the professors of his new college in the Bermudas. "I scarce remember," says Blackwell, "to have conversed with him on that art, liberal, or mechanic, of which he knew not more than the ordinary practitioners. With the widest views, he descended into a minute detail, and grudged neither pains nor expense for the means of information. He travelled through a part of Sicily on foot; clambered over the mountains, and crept into the caverns, to investigate its natural history, and discover the cause of its volcanos: and I have known him sit for hours in forgeries and founderies, to inspect their successive operations. I enter not into his peculiarities either religious or personal: but admire the extensive genius of the man, and think it a loss to the western world, that his noble and exalted plan of an American university was not carried into execution. Many such spirits in our country would quickly make learning wear another face.

It is thought, that, towards the close of his life, Berkeley began to doubt the solidity of metaphysical speculations; and on that account turned his thoughts more to the subjects of politics and medicine. The ingenious romance, entitled the *Adventures of Signior Gaudentio di Lucca*, has been repeatedly ascribed to his pen, but without sufficient authority. This performance, it is believed, was the production of a Romish priest, who wrote it for his amusement while a prisoner in the Tower of London. A complete edition of the works of Berkeley, with an account of his life, and several letters, was published in two volumes quarto in 1784; and a volume, containing his smaller pieces, under the title of *Miscellanies*, was printed under his own inspection at Dublin in 1752. (*m*)

BERKHAMSTEAD, the *Durobrivæ* of the Romans, a market town of England, in Hertfordshire, situated on a branch of the river Dale, and the grand junction canal. It consists of one street, handsome and broad. It carries on a trade in bark, shovels, and spoons, which are made of beech wood. Number of houses 333. Population 1690, of whom 167 were returned as employed in trade. See Salmon's *Hist. of Hertfordshire.* (*j*)

BERKSHIRE, one of the most beautiful of the inland counties of England, is bounded on the north by the Thames, which divides it from Oxfordshire on the westward, and Buckingham on the eastward; on the east by part of Surrey and by the Thames, which there separates it from Buckinghamshire; on the south by Surrey and Hampshire, and on the west by Wiltshire, and a small portion of Gloucestershire. It extends from 51° 19′ to 51° 48′ North Lat. and from 34¼′ to 1° 43′ West Long. Its extreme length from Old Windsor to Buscot is about 48 miles; and its extreme breadth from Witham to Sandhurst (which, by the way, is taking rather an oblique line) is about 29 miles. Its circumference is nearly 208 miles. The boundaries which nature has assigned to Berkshire are in general highly picturesque. The Thames, meandring in a very varied line along its northern and eastern sides, throws it into such an irregular form, that, while in some places it is nearly thirty miles in breadth, in others it is less than four. On the south, the hills of Surrey and Hampshire afford a charming variety of landscape; and from the eminences in its western extremity, the eye is gratified with many enchanting scenes in the adjoining counties of Gloucester, Oxford, and Wiltshire. Dr Beeke, Professor of Modern History in the University of Oxford, from astronomical observations which determined the longitude of that place, and from the trigonometrical survey taken by order of government, makes Berks, including some insulated parts, to contain about 469,500 square acres, according to the following distribution:

	Acres.
Arable land about	255,000
Meadows and dairy land in the Vale .	72,000
Sheep walks, chiefly uninclosed	25,000
Other dry pastures, parks, &c.	30,000
Wastes, chiefly barren heaths	30,000
Woods, copses, &c.	30,000
Other space occupied by buildings, courts, fences, roads, rivers, &c.	27,500
Total	469,500

From the report published by order of the House of Lords in 1805, it appears, that, "the area of Berkshire is 744 square statute miles, equal to 476,160 statute acres; the number of inhabitants on each square mile, containing 640 acres, is 147 persons, making a total of 109,368." This county is distributed into eight political divisions, viz. Faringdon, Wantage, Abingdon, Wallingford, Maidenhead, Oakingham, Newbury, and Reading. These again are subdivided into twenty-five hundreds; containing in all twelve market-towns, 148 parishes, 67 vicarages, and about 670 villages and hamlets. The names of the market-towns are Abingdon, Faringdon, Hungerford, Ilsley, Lambourn, Maidenhead, Newbury, Oakingham, Reading, Wallingford, Wantage, and Windsor. Abingdon, Reading, Wallingford, and Windsor, are parliamentary boroughs, but Abingdon returns only one member. Reading and Abingdon are both considered as county towns. With regard to its ecclesiastical connections, Berkshire lies within the province of Canterbury, and the diocese of Salisbury. It is subject to an archdeacon, whose jurisdiction extends no further than the limits of the county: it is divided likewise into four deaneries, Abingdon, Newbury, Wallingford, and Reading. The grand divisions of Berkshire marked out by nature are four. 1. The VALE, generally called the White Horse Vale, extending from Buscot to Streatly, and bounded on one side by the Thames, and on the other by the White Horse Hills, a continuation of the Chiltern range. 2. The CHALKY HILLS, which run nearly through the centre of the lower part of the county. 3. The VALE of KENNET. 4. The FOREST DIVISION, commencing on the east of the Loddon, and extending the breadth of the county to Old Windsor. The principal rivers and streams in Berkshire are the Thames, the Kennet, the Loddon, the Lambourn, the Ock, the Aubourn, the Emme, and the Broadwater. Most topographical writers take notice of a peculiarity in the Lambourn, that its stream is always full in summer, and almost lost in winter. Mr Lyson, who denies this peculiarity, admits at the same time, that it preserves throughout the whole year a pretty equal degree of fulness, being seldom affected by the drought of summer, or subject to inundation in the winter. Berkshire has no stagnant waters of any consequence. In the track of the Broadwater there is one particular spot, where it spreads in winter over a surface of about 100 acres; and this is called the Rascombe Lake; but in summer, it is generally left dry.

The substratum of this county may be said to consist, in general, either of chalk and other calcareous matter, or of gravel, with clay at greater or less depths, according to the quality of the soil. The Vale is remarkably fertile, and its prevailing soil, is a strong, grey, calcareous loam, in which vegetable mould is intimately mixed with cretaceous earth. Among the chalky hills, there are some intermediate tracks of considerable fertility, where the superficial stratum is composed of vegetable mould, mixed with chalk, flint, and gravel. In general these hills form excellent sheepwalks, being covered with a fine turf. In the Vale of Kennet, gravel soils predominate, varying, however, considerably in their qualities, admixtures, and depths from the surface. In this district there is a peculiar kind of peat, which is equally valuable as fuel or manure. The northern parts of the Forest district are distinguished by a soil of gravel, strong loam, and clay; the central parts by a tenacious clay; and the southern parts by sand and gravel.

Berkshire can boast of no valuable minerals, nor of any variety of curious fossils. In the chalk-hills nothing remarkable has been discovered, except the substance from which they take their name. At Catsgrove, near Reading, there is a stratum of chalk, 30 feet in thickness, lying upon a bed of flint. Above the chalk is a stratum of sandy clay, about a foot thick, covered by a layer of oyster-shells, two feet in depth. Above these shells there is a stratum of sandy clay, one foot and a half thick; next succeeds a greenish sand, to the depth of four feet over this three feet of a coarse fuller earth; and above all a very deep bed of clay, fit for tiles and bricks. Similar strata of sand, with oyster-shells, are found for two miles round Reading, at various depths, from 15 to 25 feet. Here likewise have been discovered an inferior kind of ochre, and different species of echini. Fossil shells, sharks teeth, parts of fishes, and other marine productions, are found in various parts of the county; and bones of animals and branches of birch trees have been dug out of the gravel pits and marshy moss-lands in Windsor forest. Pipe-clay and potters-clay are found in considerable quantities; and shell-marl was discovered in the vale of Kennet in 1794, though it does not appear to have been applied to any useful purpose. Sareden stones are irregularly scattered over the downs of Berkshire. They are composed of a fine siliceous grit, and are frequently blasted with gunpowder, and used for pitching. But the most remarkable mineral substance in Berkshire is its peat, which is almost exclusively confined to the vale of Kennet. It is defined by Mr Kirwan as a "stratification of fossil trees in all directions, mixed with a reddish, or brownish-red slimy moss, formed of the carbonic particles of vegetables, and united with their astringent juices, and calorific oleaginous fæculæ." Mr Davy, who analysed this peat, found it to consist of

Oxide of iron	48
Gypsum	32
Muriate of sulphur and potash	20
	100

At Cumner, near Oxford, there is a mineral spring, which possesses a mild cathartic quality. There is another of a mild chalybeate nature at Sunninghill, near Windsor; and Gorrick well, in the parish of Oakingham, is strongly impregnated with steel, and may be supposed to have some powerful tonic virtues.

The climate of Berkshire, though somewhat various, is in general pure and salubrious. In elevated and exposed situations, particularly in the central parts, along the course of the White Horse Hills, the air is keen and piercing; but in the more sheltered and champaign spots, the atmosphere is equally exhilarating, and salutary to the most delicate constitutions.

There are few counties in Britain where the landed property is so happily divided as in Berkshire for the purposes of general improvement. Though its annual rental, including houses, mills, and other productive revenue, arising from, or attached to the soil, cannot amount to less than £500,000, the largest estate in the county probably does not exceed £8000 a-year; a few more may amount, in annual value, to £5000, £6000, or £7000; but great landed owners are rare either among peers or commoners. Property is least divided in the lower part of the county; yet even there the yeomanry is respectable, both in number and in circumstances; and in the upper part are to be seen several handsome seats on estates, not exceeding 100 acres. One of the happiest consequences of this wide and equal division of property, is, that the scale of rank ascends by almost imperceptible gradations, from the lowest to the highest; and all classes of the community are connected by close and indissoluble bonds. The yeomanry, depressed by no slavish dependence on superiors, nor overawed by the glare of disproportionate grandeur, feel within themselves all the native dignity of man, and cherish those lofty and generous sentiments of independence which should animate every free-born heart. This exalted character of the yeomanry has a reciprocal influence on the character of the nobility and men of fortune. Aware that no ascendency can be obtained over the minds of their countrymen by the arts of corruption, they chuse the more honourable way of securing their favour, by meriting their esteem. No where, indeed, are rank and property more impotent than in Berkshire. It was observed on a particular occasion by the late Mr Pitt, whose authority on this subject is unquestionable, that "no minister of this country could command ten votes in Berkshire." A higher testimony could not be given to the virtuous independence of its inhabitants.

From what we have said of the division of property, it may well be supposed, that the number of freeholders in this county is very considerable, and it is regularly increasing. Estates are frequently purchased on speculation, and sold out again in lots; and so general has been the violation of entails, that few estates are now occupied by the lineal descendants of those to whom they belonged two centuries ago. The present value of freehold estates cannot easily be ascertained with accuracy. Some estates may be sold at 26 years purchase, and others as high as 35; but the average value may be stated, perhaps pretty fairly, at 28 years purchase, nett rent. It is highly favourable to the agriculture of this county, that the superintendence of few of the estates is devolved upon agents; and that many gentlemen of considerable landed property are most zealous promoters, and skilful judges, of agricultural improvement. By far the greatest portion of the land in Berkshire is freehold, though, in different parts of the county, there are copyhold lands, held by different tenures, according to the customs of their respective manors. The lords of the manor are, in some places, disposed to enfranchise their tenants, on equitable terms; and the advantage of this practice, both to lord and tenant, will probably soon make it general. Leases on lives, and leases renewable every seven years, under deans and chapters, and other corporate bodies, are pretty frequent in Berkshire. But the benefit of these leases is almost wholly destroyed by the magnitude of the sum demanded at their renewal. A few estates are held by leases of 1000 years; and others are leased on one or three lives, by individual proprietors; but this practice is rare, and renewals are generally refused. The lands of Berkshire are parcelled out into farms of all sizes; a circumstance extremely conducive to the welfare of a country, as men of different capitals are thus induced to apply themselves to agriculture, and to emulate each other in their schemes of improvement, and in their efforts to obtain an independent, or a comfortable livelihood. The rent is generally paid in money, except when lands are held under colleges and chapters; in these, the usual reservations of corn-rents, and sometimes of malt, are still retained. Stipulations are seldom made by the proprietors for any services, beyond what are connected with the repairs of buildings on the respective farms; and an allowance is generally made to the tenant of from three to six months rent in hand. There is nothing peculiar in the tythings of this county, except in the parish of Cumner, where the parishioners who pay tythes have a claim to be entertained at the vicarage on the afternoon of Christmas, with four bushels of malt brewed into ale and beer, two bushels of wheat made into bread, and one-half hundred weight of cheese. Money is now given in lieu of this singular entertainment. The poor rates in 1803 amounted to 4s. 11d. in the pound, amounting in all to £96,860. It must be observed, however, that they are seldom assessed on the real rent, but, in several instances, are raised according to an old valuation, founded on unknown data.

As the soil of Berkshire is peculiarly adapted to wheat, great quantities of that grain are reared in every part of the county. Next to wheat, barley is raised in the greatest abundance, and is chiefly sent to London, after being made into malt. There are many large dairy farms in some parts of the county, particularly in the White Horse Vale. The cattle are large and valuable, but there are here no native and peculiar breeds. Snowswick, a farm in the parish of Buscot, is famous for cheeses in the shape of pine apples. They are peculiarly rich and delicate in flavour, and sell considerably higher than cheeses in the common form. About two tons of them are made in good years on this single farm, which indeed is the only place, as far as we have learned, where they are manufactured. Berkshire has a peculiar breed of sheep, the distinguishing qualities of which are their great size, their height on the legs, and weight when fatted: they have black faces, Roman noses, black or mottled legs, and long tails. They are particularly adapted to the low and cold lands; and when fatted, vary as much in weight as from 14 to 40 pounds a quarter. The native hogs of this country are inferior to none in the world for compactness, easiness in feeding, and the size to which they can be brought. They are usually crossed once in six or seven generations with the Chinese or Tonquin race, which prevents them from degenerating; and one gentleman has used a half wild boar to improve his breed with the greatest success. The number of turnpike roads in Berkshire affords the farmer every facility in carrying the produce of his industry to market; but though several of the roads are good, and follow the most judicious lines, they are frequently very inferior to what the abundance of valuable materials in every part of the county, and the ample revenues, would entitle the traveller to expect. Few inland counties possess such advantages in point of navigation as Berkshire. In its western division, no part of the triangle formed by the Thames on the north-east, the Kennet on the south, and the Wilts and Berks canal on the west, is distant more than twelve miles from water carriage; and in the east and south eastern parts, the distance is nowhere greater either from the Basingstoke canal, the
Thames, or the Kennet. The Kennet and A
nal, too, now executing under the powers o
successive acts of parliament, commences at
ry; and that part of it within the limits
county has been navigable ever since the year

Few manufactures are carried on in Be
From the returns made to parliament in 1801
pears that out of a population of 109,21
16,921 were engaged in trades, manufact
handicraft. Besides local manufactures for
consumption, the only one of any importanc
of copper at the Temple mills. These mills
to be the most powerful and complete in th
dom. During war the copper is manufactured
into bolts and sheathing for ships, in the s
government. In time of peace various
sheets are formed for domestic purposes, and
reign trade. The quantity of copper manu
here is from 600 to 1000 tons. About f
and boys are employed in this establishment
consists of a hammer-mill, a bolt-mill, and a
ling-mill, all worked by water.

We cannot dismiss this article without ta
tice of the celebrated White Horse, which
tiquaries refer to Saxon origin, though Mr
of opinion that it is more likely to have been
of the Britons than, as is usually supposed,
rial for Alfred's victory over the Danes. It
ed by paring off the turf from the brow of
chalky hill above Uffington, and from some
view may be seen at the distance of twelve
is now nearly obliterated by the grass gr
its surface. There are some other monu
antiquity in Berkshire, but they are not
importance as to merit particular notice in t
See Mavor's *Agricultural Report of Berksh*
Lyson's *Magna Britannica*, vol. i. (μ)

BERLIN, a city in Germany, the capital
denburg, and the residence of the Prussian
situated on the banks of the Spree, a co
stream which falls into the Havel, one of t
tary rivers of the Elbe. The situation of
by no means agreeable, for it stands on an
and sandy plain, but it combines almost eve
tage of appearance and utility, which art,
by the beneficent policy of an enlightened
has been able to confer. Frederic II., who
ed all his intervals of peace in improving the
condition of his states, bestowed much care
pense on the embellishment of his capital.
war of 1756, he had already reared several p
fices, and entirely rebuilt the suburb called N
land, the houses of which he gave gratuitou
proprietors. In that dreadful period of c
which ensued, Berlin fell twice into the han
enemy. Haddik, the Austrian general, ente
city in the year 1757, and in the space of
carried off 200,000 German crowns. Th
after, it was seized by the combined arm
Austrians and Russians, who exacted from
millions of crowns, a sum which it was nece
borrow. The debt was liquidated by Fred
the conclusion of the war, nobody knows
period, nor was any additional burden ever
on the inhabitants for that reimbursement.

[illegible]

[illegible] the garrison church [illegible] Schwerin, Keith, and Winterfeldt [illegible] The church of St. Nicholas [illegible] the Calvinists [illegible] the Lutherans [illegible]

Besides these buildings, we may notice the opera house, the palace and gardens of Monbijou, the house and garden of Bellevue, the hall of the Academy of Sciences, which contains the anatomical theatre and the observatory; the magnificent hospital of invalids, which maintains about a thousand officers and soldiers; the palaces of Prince Henry and the Prince Royal; and the new Catholic church of [illegible] which contains the burying place of the royal family.

There are several large squares in Berlin, the principal of which is William's square, which is adorned with marble statues of the four great officers who distinguished themselves in the seven years war, viz. Schwerin, Seidlitz, Keith, and Winterfeldt. [illegible] of his officers at the battle of Prague, when he [illegible] were giving way, exclaiming [illegible] follow me." On the bridge over the Spree there is a colossal and equestrian bronze statue of the Great Elector Frederic William, which is reckoned the chef d'oeuvre of Schluter. The man and horse were cast in one piece, and the whole weighs [illegible] quintals.

There are several excellent public walks and gardens in Berlin and its environs. Before the houses of Berlin, on each side, is a [illegible], and between these causeways is a fine gravel walk, planted with lime-trees, which is always a fashionable place of resort. The park on the south side of the Spree is above three miles round, and is frequented by great crowds on Sunday, when they are provided with every kind of refreshment and amusement. The park at Charlottenberg, where the court resides in summer, is also an agreeable place of resort. At Bellevue is to be seen the bust of Prince Henry of Prussia, a *chef d'oeuvre* of Houdon, and also the monument of Baron Bielefield. The environs of Berlin are remarkably pleasant, and are adorned with beautiful villas, canals, and vineyards. The palace of Schoenhausen; the mineral waters at Fredericksbrunnen; the beautiful villages of Buchholz and Pankow; the view of the famous fortress of Spandau, from the top of the hill at Pickelswerder, are among the objects which adorn the environs of Berlin.

In Berlin there are numerous establishments for the advancement of literature and science, and for the promotion of useful and benevolent purposes. Besides the Academy of Sciences, which we have already fully described in the article ACADEMY, there are; the royal college of medicine and surgery; the clinical institution; the royal veterinary school; the royal academy of arts and the mechanical sciences; the royal academy of architecture; the royal riding academy; the royal military academy; the society of physicians; the pharmaceutical society; the pedagogical society; the academy of singing; the philomathic society; the humane society; besides 5 colleges, an institution for the deaf and dumb, numerous schools with pensions, and 41 *hospices* for charity and health.

There are a great number of valuable manufactures carried on in Berlin. In the manufacture of silk no fewer than 2788 looms, and 5085 workmen, were employed in the year 1799, and the value of what they manufactured amounted to 1,869,880 crowns. In the manufacture of woollen, cotton, and linen goods, 4224 looms were employed, and 4689 workmen; the annual value of their work in 1799 being 2,850,760 crowns. In the various other manufactures, which are 44 in number, the workmen employed were 4337, and the annual value of their produce 3,522,480 crowns. The whole number of looms employed in Berlin were 7014, the number of manufacturers and artizans 14,406, the annual value of their work in 1799, 8,350,028 crowns, the value of the original materials 5,190,084 crowns, the value of the articles sold in the kingdom 6,844,922, and the value of those sold out of it 1,123,058.

Berlin is divided into five separate towns or wards, viz. Berlin Proper, Cologne or Coeln, Fredericksweder, Dorothestadt or Neustadt, and Frederickstadt. Berlin Proper, which was founded in the 12th century by a colony from the Netherlands under Albert the Bear, lies in an island formed by two arms of the river Spree. Cologne, which is probably of the same antiquity, also lies in an island formed by two arms of the Spree, and is separated from Berlin Proper by the principal arm of that river, which is crossed by four bridges, three of which are of stone and one of wood. Frederickswerder and Dorothestadt w both built by the Elector Frederick William, latter of which he called after his wife Dorot and which is the finest part of Berlin. Frederi stadt was founded by the Elector Frederick I forming the south-west part of the town, and join with Frederickswerder. The streets are remarka spacious and regular, and are adorned with lime-tr

The interior oeconomy of the houses in Berli far from corresponding with their outward app ance. In handsome houses, the apartments are i ruinous state, and the furniture mean and dirty. diers lodge in the ground floor, and mechanic the lowest class occupy the upper story. A sim contrast exists between the external appearanc the inhabitants and the comforts which they enjo home. Every expence conducive to true comfo grudged; while nothing is spared to deck the sons of the ladies. The number of courtezan greater in Berlin than in any other town in Eur of the same size, and they observe none of that ternal decorum which is to be seen among this lic tious class in other parts of the continent.

During the 15 years from 1769 to 1782, M. guelin found the average temperature of Berlin be 49°.

In 1645 there were only 1236 houses in this ci in 1747, they amounted to 5513; in 1779, to 64 and in 1790, to 6950. The population, includ the garrison of 30,000, amounts to 169,000, wh is above 20 inhabitants to one house. East Lo 13° 26′ 15″, and North Lat. 52° 32′ 30″. See Re hard's *Tableau de Berlin a la fin du* 18*me* sie Berl. 1801. Mila, *Guide de Berlin*, &c. 1802. colai *Description de Berlin*, &c. 4 vols 8vo, 17 Reichard's *Guide des Voyageurs en Europe*, 180 tom. ii. p. 40. Reisbeck's *Travels*, vol. iii. Moor *Travels*, &c. vol. ii.; and Thiebault's *Sejour Vingt ans a Berlin*, 3 vols. (*x*)

BERMUDAS, or SOMERS' ISLANDS, are situ in the Atlantic ocean, in W. Long. 63° 28′, N. La 32° 35′; and are between 200 and 300 leagues di tant from the American continent, and the oth West India islands. They were discovered in 15 by John Bermudas, a Spaniard, who merely saw the at a distance, and gave them his name; but who d not land upon them, or acquire any information co cerning them. About the same time, Henry M an Englishman, was shipwrecked upon one of t largest of these islands; returned to Europe in a ve sel of cedar wood, which he had found means to bu there, by the help of materials collected from t wreck of his own ship; and was the first who pu lished any account of the Bermudas. They we found, at their first discovery, to be entirely unin bited; and though, in 1572, the king of Spain ma a grant of them to one of his subjects, no settleme was formed upon any of them by the Spaniards. I 1609, Sir George Somers, Sir Thomas Gates, a Captain Newport, on their way to Virginia as depu governors, were cast upon the Bermudas;* and di agreeing among themselves, each of them built a sh of the cedar growing upon the islands, in which the

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* From this event, Shakespeare is supposed to have taken the name and several of the incidents of his comedy, "T Tempest." Douce's *Illustrations of Shakespeare*, vol. i. p. 5.

the growth of cotton was attempted, but with little success; and in 1800, there were not more than 200 acres applied to that purpose. See Pinkerton's *Geography*, vol. ii. p. 631. Edward's *Hist. of West Indies*, vol. i. p. 516. Raynal's *Hist. of West Indies*, vol. v. p. 52. *Modern Univ. Hist.* vol. xli. p. 339. (*q*)

BERN, the largest and most important of the thirteen cantons of Swisserland, is bounded on the north by the cantons of Soleure and Basle, and the Austrian forest towns; on the east by the cantons of Uri, Underwalden, Lucern, and the county of Baden; on the south by the Valais, the lake of Geneva, and the duchy of Savoy; and on the west by the canton of Soleure, the county of Bienne, and part of France. Its extent embraces about one-third of Swisserland, and contains one-fourth of the whole population; yet it held only the second rank among the cantons, following immediately after Zurich. This canton is divided into two large branches or districts, called the German district, and the Roman district, or the Pays de Vaud; the former of which extends from Murat or Murten, to the Rhine; the latter from Murat to Geneva.

The rugged and stupendous mountains which encircle the canton of Bern, its deep and gloomy forests, its lakes and marshes, while they exhibit the most picturesque and varied scenery, seem at first view to promise but little fertility, and to present insuperable obstacles to the operations of agriculture. In common years, indeed, its crops are insufficient for the consumption of the inhabitants; yet there is no country in Swisserland which presents in general a more smiling appearance, and where the triumphs of labour are more strikingly displayed. Its marshes are converted into luxuriant meadows; the sides of its mountains are covered with vineyards; and rich harvests are extorted from every portion of the soil where it is possible to guide the plough, or to carry the spade. Previous to its subjugation by the French, Bern was one of the happiest countries in the world. With the exception of the nobility, who disdained to engage in any business but the government of the state, every hand was employed in industry; a general air of prosperity prevailed throughout the land; and the hut, even of the lowest peasant, was the abode of comfort and content.

To give our readers an idea of the general appearance of this once-favoured country, we shall conduct him through its different provinces in an excursion from the capital, directing his view, as we pass, to the objects most attractive in its scenery, or most important as characterising the progress of improvement, the resources of the state, or the manners of the people. The small district immediately surrounding the capital, though by no means naturally fertile, is extremely interesting from the activity of its numerous population, animated by the facilities which the town affords for disposing of the fruits of their labour, to the most eager diligence in cultivating their fields. By far the most beautiful part of this district, is the valley between Bern and Thun. It is refreshed and enlivened by the river Aar, on the banks of which are many handsome villages; and the lowest parts of the mountains which bound the valley are adorned with castles and villas, equally delightful by the views which they
command, the richness of their domain, and
ber of their living springs. The rest of the
is occupied by mountains; on the heights,
reverse of which, are seen forests of fir trees,
with beeches and oaks.

To the south of this district is Oberland, o
vince of the Alps, which branches out into se
lies from the lake of Thun to the Glaciers.
in the scenery of Swisserland is finer than the
of the castle and town of Thun. They st
the brink of a charming basin, which is for
lake surrounded by mountains in the form o
phitheatre, above which appear in distant per
the aerial summits of the Alps, clad in ev
snows. The banks of the lake are covered w
yards, which, though not remarkable for th
riance or their quality, add much to the beau
scenery. Above these the country is rug
high, sprinkled with some trees, and enlivene
mer by the herds and flocks that browze on
age. The valley which lies between the lake
and the lake of Brientz, narrowed on each sid
proximating mountains, has been aptly ter
vestibule of the Alps: It is formed entirely
rolled down by torrents from the mounta
seems to have been interposed in some dread
vulsion, as a barrier to the once united lak
it now separates.

From the extremity of the lake of Brientz,
ley stretches for nine or ten leagues, regularly
ing till its meets the foot of the Grimsel, whi
a branch of the lofty ridge of St Gothard. Th
called the country of Hassle, is frequently in
by the Aar, which, taking its source under t
ciers, forms, before its fall into the lakes, a mo
tuous and destructive torrent. The whole of t
and sequestered vale is cheerless and ill-peopl
as their herds form the only resource of its inh
they seldom rise above poverty and want. T
valley between the two lakes presents a very
scene. Its temperate climate induces all th
herds of the neighbouring Alps to assemble
winter with their families; and in the extent
two square leagues, it contains two towns,
residence of a bailiff, and is covered with villa
tages, and orchards. From thence we pass
the mouth of very savage mountains, into tw
lated vallies. That of Lauterbrunnen on th
terminating at the foot of the enormous gla
the Virgin, is remarkable for the cascade of th
let of Staubach, which, swelled by the rain
from a perpendicular height of eleven hundre
On the left, the very elevated valley of Grinde
presents, amidst the horrors of a desert, the int
ing picture of an Alpine colony, inhabiting a
and well cultivated spot of ground, terminated
south by abysses of eternal ice. It was from
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took the originals of his pictures.

To the south and south-east of the lake of T
extend the bailliages of Frontinguen and Sieben
The first forms a very wide and fertile valley
lower part, which becomes narrower and wilder
the land is more elevated. At the southern ext
ty, a road is cut out of the rock which overhang
precipices, conducting to the baths of Leuk,

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[illegible] of their domain, and the number [illegible]. The rest of the province [illegible] on the heights, and the [illegible] are seen forests of fir trees, mingled [illegible].

[illegible] this district is Oberland, or the province of the Alps, which branches out into several vallies from the lake of Thun to the Glaciers. Nothing in the scenery of Swisserland is finer than the situation of the castle and town of Thun. They stand near the [illegible] of a charming basin, which is formed by a lake [illegible] by mountains in the form of an amphitheatre, above which appear in distant perspective, the several summits of the Alps, clad in everlasting snows. The banks of the lake are covered with vineyards, which, though not remarkable for their luxuriance or their quality, add much to the beauty of the scenery. Above these the country is rugged and [illegible] sprinkled with some trees, and enlivened in summer by the herds and flocks that browze on its herbage. The valley which lies between the lake of Thun and the lake of Brientz, narrowed on each side by approximating mountains, has been aptly termed the *vestibule* of the Alps: It is formed entirely of stones rolled down by torrents from the mountains, and seems to have been interposed in some dreadful convulsion, as a barrier to the once united lakes which it now separates.

From the extremity of the lake of Brientz, the valley stretches for nine or ten leagues, regularly ascending till its meets the foot of the Grimsel, which forms a branch of the lofty ridge of St Gothard. This track, called the country of Hassle, is frequently inundated by the Aar, which, taking its source under the Glaciers, forms, before its fall into the lakes, a most impetuous and destructive torrent. The whole of this cold and sequestered vale is cheerless and ill-peopled; and as their herds form the only resource of its inhabitants, they seldom rise above poverty and want. The small valley between the two lakes presents a very different scene. Its temperate climate induces all the shepherds of the neighbouring Alps to assemble here in winter with their families; and in the extent of about two square leagues, it contains two towns, each the residence of a bailiff, and is covered with villages, cottages, and orchards. From thence we pass through the mouth of very savage mountains, into two insulated vallies. That of Lauterbrunnen on the right, terminating at the foot of the enormous glaciers of the Virgin, is remarkable for the cascade of the rivulet of Staubach, which, swelled by the rain, falls from a perpendicular height of eleven hundred feet. On the left, the very elevated valley of Grindelwald, presents, amidst the horrors of a desert, the interesting picture of an Alpine colony, inhabiting a fertile and well cultivated spot of ground, terminated on the south by abysses of eternal ice. It was from these singular countries that the immortal poet of the Alps took the originals of his pictures.

To the south and south-east of the lake of Thun, extend the bailliages of Frontinguen and Siebenthal. The first forms a very wide and fertile valley in the lower part, which becomes narrower and wilder as the land is more elevated. At the southern extremity, a road is cut out of the rock which overhangs the precipices, conducting to the baths of Leuk, famous

Bern.

piousness and medicinal virtue of its hot

tiers of Oberland, on the south, present
glaciers and snow-clad summits. Here,
valley, extending between two of the
es of the Alps, to the length of ten or
ues, is filled by one unbroken mass of ice.
ain of Alps, likewise intersected by gla-
, on the north of the valley of Hassle,
s of the cantons of Uri and Underwalden.
vince of Emmethal extends from Thun
ontiers of Underwalden and Lucern. It
by broken chains of mountains and hills,
r gradually towards the Aargau. The
ed summits of these mountains are cover-
od, or with excellent summer pasturage;
ich are well exposed to the sun are culti-
ery great height, while the vallies present
of a rich and exquisite culture. No
the peasantry enjoy more easy circum-
d more real advantages, than in Emme-
les the abundant productions of its soil,
e is enriched by its manufactures of cloth
s; and affords a striking and instructive
e advantages resulting from the union of
industry with agriculture, the first and
al of all.

the Emmethal and the canton of Soleure
per Aargau, an open country, abound-
meadows and fertile fields. The bail-
arbourg separates the Upper from the
gau. Here the territory of Bern is con-
the cantons of Lucern and Soleure to
of half a league. To such perfection is
of irrigation here carried, that the best
e valued at upwards of 5000 French livres
The four counties of Aarberg, Erlach,
Baren, form a district which extends
ver extremity of Neufchatel Lake to the
oleure. The soil of this district is in ge-
and well cultivated. This country reaches
of Mount Jura, and borders on the bi-
Basle.

s de Vaud, chiefly wrested by conquest
ikes of Savoy, is the most extensive pro-
canton of Bern, and is one of the most
nd abundant countries in Swisserland.
ity of the lake of Murat, the climate
the soil luxuriant. Vines, tobacco, and
cultivated there with the greatest suc-
rds, stocked with every species of fruit
owed down to the ground by the weight
it; and the meadows are covered with
and most beautiful pastures. The bail-
loudon, Oron, and part of Lausanne,
Little Jura, separated from the Great
Gros de Vaud. This district is moun-
less productive than the Pays de Vaud;
in the more elevated parts, it produces
quantities of grain.

from Moudon to Lausanne, it is necessa-
mountain; on descending the opposite
h, the lake of Geneva opens full on the
magnificent reservoir of water forms, on
bank, a curve of about fifteen leagues.
part of this district resembles the province of Oberland; but its lower region, washed by the Rhone from the confines of Valais, enjoys a warmer climate than any other part of the whole canton. At Bevieux, (See Bevieux,) in this government, are the only salt springs to be met with in the country of Swisserland.

Proceeding along the border of the lake, we come next to Vevay, a handsome and flourishing town, surrounded by vineyards, behind which the country ascends, and is adorned with fields of corn, and covered with verdant pastures. Between Vevay and Lausanne are the four parishes of the Pays de la Vaud, the wines of which are in great request. The country above Lausanne, which is the second town in the canton, is mountainous, bleak, and uninteresting; but below the town, and opposite to the bailliage of Morges, the scenery is enchanting. Vineyards, meadows, and corn fields, indicate a genial soil; while these native beauties, aiding the picturesque illusion which different points of view produce on these charming banks, present the appearance of one vast continued garden. On approaching Morges, the climate still improves. That beautiful town stands at the bottom of a small gulf, where the lake of Geneva expands to its greatest breadth. The interior of this district is in general fruitful in grain, and extensive vineyards of the finest quality enrich and beautify the coast. The bailliages of Nyon, of Romainmotier, and Yverdon, complete the topography of this canton; but, as they are marked by no very peculiar feature, they scarcely deserve to be separately described.

If the different provinces of Bern vary in appearance, in soil, and in climate, there is an equally perceptible difference in the genius, the manners, and disposition of the inhabitants. The mountaineers of Oberland, the peasants in the environs of the capital, or in the province of Emmethal, the inhabitants of Aargau, and those of the four counties, are so many distinct nations, easily recognised by their language, their dress, and their manners. But the most striking difference takes place between the inhabitants of the German district, and those of the Pays de Vaud. The former are grave, cool, and contemplative; fond of their country, with which they are at the same time proud of being connected; dull in their pleasures, slow in their operations, but regular and systematic in all their conduct. No acquisition of wealth could ever excite in the breast of a peasant of this country the smallest ambition to connect himself with a noble family, nor would he even allow his children to intermarry with the citizens. He courts no office of power; he never voluntary leaves his country; and when necessity has forced him from it, different habits and modes of life generally excite such a regret for his native land, as becomes, especially among the mountaineers, a malady often fatal. The women of this nation are industrious, punctual in all affairs of household economy, assiduous in the cultivation of their gardens, in spinning, and in the other proper occupations of their sex.

The people of the Pays de Vaud are in general gayer, and more polished; possessed of a livelier imagination, pliant in their character, working with more ardour than constancy, giddy, improvident, and fond of emigration. The women who have not been im-

Bernoulli, James.

semidiameters of the *orbis magnus.* Upon these principles, he predicted that the comet of 1680 would return on the 17th May 1719, and would be situated in the 12th degree of Libra; but, alas! his prediction, founded on such a theory, could not be otherwise than false, though, like Phaeton, to follow out the simile contained in his own device,

Magnus, tamen, excidit ausis.

Soon after the publication of this work he left Basle, and visited Flanders and Holland on his way to England, where he was introduced to the most eminent philosophers of the times, and attended all their philosophical meetings in London. On his return to Basle in 1682, he commenced a course of public experiments on natural philosophy; and, in the same year, he published, at Amsterdam, his *Conamen novi systematis cometarum, pro motu eorum sub calculum revocando et apparitionibus predicendis,* 8vo, Amstel. 1682; a work not altogether unworthy of his genius. In 1682, he published his dissertation *De Gravitate Ætheris,* which is not distinguished by any peculiar marks of its author. It treats principally of ether, that hypothetical substance by which Euler, his great successor in the career of geometrical discovery, endeavoured to explain the various phenomena of nature. After this work was composed, Bernoulli found, that many of the views which it contained had already been given by Malebranche, in his *Recherche de la Verité;* and he declares in his preface, that he had not read that celebrated work.

About this time he established at Basle a kind of experimental academy, where he made a number of experiments on different points in physics. The professorship of mathematics at Heidelberg having become vacant in 1684, James Bernoulli was elected to that office, and, during the three years which he spent in that university, he devoted himself, with the utmost ardour, to the study of geometry. The paper of Leibnitz, entitled, *Nova Methodus pro maximis et minimis, itemque tangentibus, quæ nec fractas, nec irrationales quantitates moratur, et singulare pro illis calculi genus,* with the application of the calculus to the solution of several physical and geometrical problems, appeared in the Leipsic acts for 1684, and were the first attempts of that great philosopher to employ the new calculus which he had invented. The attention of James Bernoulli was particularly attracted by this paper, and he and his brother John, who had been studying mathematics under him, were so delighted with these elements of the differential calculus, that they embraced it with avidity, and by extending its limits, and applying it with success to several curious problems, they, in the opinion of Leibnitz himself, made the discovery in a great measure their own.

Before James Bernoulli entered upon this brilliant career of discovery, he was elected, in 1687, to the professorship of mathematics at Basle, an office which he filled with distinguished reputation during the whole of his life. He succeeded Peter Megerlin, who is known to astronomers as a zealous defender of the Copernican system.

In 1690 James Bernoulli solved the problem of
the isochronous curve, of which Huygens
nitz had already obtained a solution; and o
casion he proposed the celebrated proble
catenarian curve, which Galileo had trie
Huygens, Leibnitz, and John Bernoulli so
ed a solution; but this solution was ext
James Bernoulli to cases, in which the wei
chain varies in different parts of its length,
to a given law. This able mathematician d
also the curvature of a bended bow, and that
tic rod, fixed at one end, and loaded at the
a given weight. He found likewise, that th
sail, swollen by the action of the wind, is th
catenarian curve when the wind does not es
that it is one of the curves called *Lintearia*
sail is supposed perfectly flexible, and expa
a fluid pressing in every direction. John
published a solution of the same problem in
nal des Sçavans for 1692; but it appears u
able, that he had received hints from hi
who communicated to him, by letter, hi
upon that subject.

The theory of curves, produced by the
of one curve upon another, now occupied
tion of James; and in this rich and untro
he made many interesting discoveries.
that the logarithmic spiral was its own evo
evolute, caustic, and pericaustic; and tha
cloid had a property analagous to it. The
of this constant reproduction of the logari
ral was a source of such pleasure to Berno
in imitation of Archimedes, he requested
garithmic spiral should be engraven on
with the motto of *Eadem mutata resurgo,*
ful and happy allusion to the future hop
Christian. Besides these discoveries, Ja
noulli solved the problem of the paracentri
nal curve, proposed by Leibnitz in 1689
the problem of the curve of quickest desce
his brother John had proposed in 1697.

About this time began that famous dis
isoperimetrical problems, between James
Bernoulli, in which their talents were dis
greater advantage than their dispositions.
illustrious characters," as the writer of t
has elsewhere observed, "connected by the
ties of affinity, were, at the commencemen
distinguished career, united by the warmest
John was initiated by his elder brother into
thematical sciences; and a generous emula
ened by friendship in the one, and gratitu
other, continued for some years to direct
dies, and accelerate their progress. Ther
men, however, who can support, at the
the character of a rival and a friend. T
of the one party is apt to awaken the en
other; and success itself is often the pare
sumption. A foundation is thus laid for
sensions; and it is a melancholy fact in the
learning, that the most ardent friendships
sacrificed on the altar of literary ambition.
the case between the two Bernoullis. A
John was settled professor of mathematics
ningen, all friendly intercourse between the
there was at an end. Regarding John as t

sor, and provoked at the ingratitude which he exhibited, his brother James challenged him, by name, to solve the following problems:" 1. To find among all the isoperimetrical curves, between given limits, such a curve that, a second curve being constructed, having its ordinates any functions of the ordinates or arcs of the former, the area of the second curve shall be a maximum or a minimum. 2. To find, among *all* the cycloids which a heavy body may describe in its descent from a point to a line given in position, *that* cycloid which is described in the shortest time ossible. A prize of 50 florins was offered by James his brother John, if he should solve these problems the space of three months, and produce legitimate tions in the course of a year; and if, at the ex- r of these intervals, no solutions appeared, he pro- ed to lay his own before the public. This chal- ge was willingly accepted by John, who began investigation as soon as he received the subject, soon completed the solution. Elated with suc- , he ostentatiously declared, that, instead of three nths, he had discovered the whole mystery in e minutes. He demanded the prize, and offered give to the poor what had cost him so little trou- to gain. Unfortunately, however, for John, his ation of the isoperimetrical problem was erro- us. His brother published a notice, in which he ne under three engagements: 1. To point out the thod employed by his brother; 2. To expose its ors, whatever the method was; 3. To give a true ution of the problem. The boldness of this notice uced John to revise his solution; and, having found mistake, which he ascribed to the hurry in which it s obtained, he sent a new solution, and again demand- the prize. In reply to this demand, James Bernoulli quested his brother to examine his new solution, the pretext of hurry would be unavailing after a ond failure; but John replied, that his solution s correct, and that his time would be better em- yed in making new discoveries. In a letter to rignon, which was inserted in the *Journal des Sça- s*, with an additional notice, James Bernoulli at- ked, with a good deal of ridicule and sarcasm, solution of John, who read the letter with the most indignation, and lavished on his brother a rent of the coarsest invective.

In order to put an end to this geometrical warfare, ich had now degenerated into personal abuse, eibnitz, Newton, and the Marquis de L'Hospital, re appointed arbiters; but they do not seem to ve come to any decision on the subject. In 1700, mes Bernoulli published, in a letter to his brother, formulæ of the isoperimetrical problem without a monstration, and invited him to make his own pub- . John was still ignorant of the defect of his own thod; and so much was he convinced of its accu- y, that he sent it under seal to the Academy of ences at Paris, in February 1701, on condition that should not be opened till the appearance of his other's demonstration. In consequence of this, mes Bernoulli published his solution separately at asle, and also in the acts of Leipsic for May 1701, der the title of *Analysis magni problematis Isope- metrici*. The fame which was acquired by this ad- mirable specimen of mathematical genius completely silenced the pretensions of John Bernoulli for five years; but after the death of his brother, in 1705, he published his solution in the memoirs of the academy for 1706, as if he had thought his brother the only person who could detect the false principle upon which it was founded. After an interval of thirteen years, John Bernoulli discovered the source of his error. He ingenuously confessed his mistake; and published a new solution in the memoirs of the academy for 1718, which did not differ much from that of his brother.

In the year 1699, James Bernoulli was elected a foreign associate of the Academy of Sciences at Paris; and, in 1701, the same honour was conferred upon him by the Royal Academy of Berlin. The sedentary life which he led, and his intense application to study, brought upon him a severe attack of the gout, accompanied with a slow fever, which put an end to his life on the 16th of August 1705, in the 51st year of his age. He was married in the year 1684, and left behind him one son and a daughter, neither of whom seem to have inherited any portion of their father's genius. The son was bred to the profession of a painter. James Bernoulli was engaged, at the time of his death, in a work entitled, *Ars Conjectandi*, or the art of forming conjectures concerning contingent events. It was printed at Basle in 1713; and contains a valuable treatise on infinite series, in which its author has given an admirable demonstration of the first case of the binomial theorem. This demonstration has been lately re-published in the third volume of the *Scriptores Logarithmici*, by Baron Maseres.

Bernoulli was of a bilious and melancholy temperament, and possessed great perseverance in surmounting difficulties. His genius, though of the first order, was not of that quick and versatile character which seizes a subject with instinctive penetration, and invents and discovers by a process almost intuitive. It was marked rather by an excess of caution. He proceeded with slowness and suspicion, afraid of error, yet resolved to avoid it; and even after success had taught him the extent of his own powers, and after the applause of all Europe had stamped immortality upon his name, he did not possess that confidence in his talents which is generally the most prominent qualities of flattered genius. When he challenged his brother John to the solution of the isoperimetrical problem, on which he had for a long time laboured, he acted with more confidence than he usually displayed; but his excessive caution gave him ample security against the chance of error. His brother John, on the contrary, whose genius was more acute but less profound, obtained his solution of the problem almost instantaneously. Without even revising his investigations, he gave them to the world, careless about the mortification which he afterwards felt when they were proved to be erroneous. In the keen dispute which this circumstance occasioned, the characters of the two brothers appeared in their natural colours. The cold defiance, the chastened severity, and the temperate sarcasms of the one, form a striking contrast with the thoughtless ostentation, the rude invectives, and the coarse raillery of the other.

The writings of James Bernoulli are very numerous, Bernoulli, John.

and have been collected and published in two volumes, 4to, at Geneva in 1744. The papers which he published in the memoirs of the academy, are, 1st, *Section indefinie des Arcs Circulaires, en telle raison qu'on voudra, avec la maniere d'en deduire les Sinus,* &c. Mem. Acad. 1702, p. 58. 2d, *Demonstration Generale du centre de Balancement, ou d'oscillation, tirée de la Nature du Levier,* Id. 1703, p. 114. 3d, *Application de sa regle du Centre de Balancement, a toutes sortes de figures,* Id. 4th, *Demonstration du Principe de M. Huygens, touchant le Centre de Balancement, et de l'Identite de ce Centre avec celui de Percussion,* Mem. Acad. 1704. 5th, *Veritable Hypothese de la Resistance des Solides, avec la Demonstration de la courbure des Corps, qui font ressort.* Mem. Acad. p. 130.

Besides these he published no fewer than forty-seven papers in the *Acta Eruditorum* of Leipsic, mostly mathematical, though some of them related to pneumatics, and others to mechanics. He published also seven papers in the *Journal des Sçavans,* some of which had appeared in the *Acta Eruditorum.* See *Œuvres de Fontenelles,* tom. v. p. 57. edit. 1767. *General Dict.* Lalande, *Bibliographie Astronomique,* p. 299. Montucla, *Hist. des Mathemat.* tom. ii. p. 355. 444. Bossut, *Essai sur l'Hist. Gen. des Mathemat.* tom. ii. p. 30. *Athenæ Rauricæ. Adumbratio eruditorum Basiliensium celebrium, Athenis Rauricis addita,* Basil, 1780, 8vo. (β)

BERNOULLI, John, the tenth son of Nicholas Bernoulli, and the brother of James Bernoulli, was born at Basle, in Switzerland, on the 27th of July, O. S. 1667. In the year 1682 he began his academical studies, and was soon afterwards sent to Neufchatel, to prepare himself for those commercial pursuits for which he was intended by his father. The early developement of his brilliant talents, seconded by an ardent thirst for knowledge, gave a new direction to his father's plans, who henceforth determined to form the mind of his son for those noble pursuits in which nature had destined him to engage. He was received master of arts at the age of eighteen; and on this occasion he defended a Latin thesis, *De igni lambente,* and likewise a thesis in Greek verse. The study of medicine now occupied his attention; but though he prosecuted this subject to such a length as to compose and defend in public a thesis *De effervescentia et fermentatione,* in 1690, his mind was gradually turning to that sublime science, in which his brother had already acquired such distinguished fame. Under the guidance of that illustrious mathematician, he made rapid advances in the higher geometry, and was soon enabled to illustrate the new calculus which Newton and Leibnitz had discovered. About the end of the year 1690, John Bernoulli set out for Geneva; and, in the course of his journey, he nearly lost his life by a dangerous fall from his horse. In that seat of learning, he formed an intimacy with many of its most distinguished citizens, and particularly with Messrs Fatio, who were then celebrated for their mathematical acquirements. From Geneva he went to France; and having reached Paris about the year 1691, he was introduced to the Marquis de L'Hospital, Malebranche, De la Hire, Varignon, and the two Cassinis. He spent some
time at the country house of the Marquis de L'
pital near Blois, and such was the friendship w
subsisted between them, that he instructed his h
the differential calculus, and composed for his
Leçons de Calcul differential et integral, whi
published in the third volume of his works. V
non was likewise initiated into the new geometr
the Swiss mathematician; who soon enjoyed th
tisfaction of seeing these distinguished pupils ra
among the first analysts of the age. In the
1692, he returned to his native country, wher
loss of the brilliant society of Paris was com
sated by a constant correspondence with Leib
which continued till the death of the latter in
Being about to enter into a matrimonial connectio
was prevented by this and other causes from acce
the professorship of mathematics at Wolfenb
which was offered him in 1693. The degree of d
of medicine was about this time conferred upon
after having defended a thesis on muscular mo
His marriage took place on the 6th March, 1
and, in obedience to the solicitations of the unive
of Groningen, in 1695, he accepted the professo
of experimental philosophy, in which he was inst
on the 28th of November. In this new situatio
fame began to extend itself with unusual rap
The learned societies of Europe were proud to
their lists with his name, and sovereigns them
felt an accession to their greatness by honouring
with marks of royal favour. He was elected
reign associate of the Academy of Sciences at
in 1699, along with his brother. The Academ
Berlin chose him a member in 1701. He was i
duced into the Royal Society of London in 17
into the Institute of Bologna in 1724; and into
Imperial Academy of Sciences at St Petersburg
1725. His invention of the luminous baromete
of the mercurial phosphorus, arising from the fri
of mercury upon glass in a partial vacuum, was sh
by Leibnitz to Frederick I. of Prussia, who pre
ed Bernoulli with a golden medal of the weigh
forty ducats.

In 1691, John Bernoulli solved the problem of
catenary curve along with Leibnitz and Huyg
though it is generally supposed, that this solu
was partly the work of his brother. In 1697,
published his first essays on a new branch of anal
to which he gave the name of the Exponential Ca
lus, which consists in differencing and integrating
ponential quantities, or powers, with variable e
nents. Leibnitz and John Bernoulli made this imp
ant discovery, without any communication, in 16
but we are indebted to Bernoulli for a complet
planation of the rules of the calculus, and the
poses to which it might be applied. About
same time, he directed the attention of mathem
cians to the celebrated problem of the *brachystoc*
non, which consisted in finding the curve, along
concave side of which a heavy body would des
from one point to another in the least time pos
the line joining the two points being inclined to
direction of gravity. This difficult problem, w
Bernoulli himself had solved, was also resolved
Leibnitz on the very day on which he receive
These two mathematicians determined to conceal

solutions for some time; but before they were published, Sir Isaac Newton, the Marquis de L'Hospital, and James Bernoulli, succeeded in demonstrating, that this curve, called the curve of quickest descent, is a reversed cycloid. While employed on this subject, James Bernoulli was led to the subject of isoperimetrical problems, which occasioned those differences with his brother which we have already related in the preceding article.

The problem of orthogonal trajectories, which Leibnitz had proposed to the English geometers, was completely resolved by John Bernoulli in the Leipsic Transactions for 1718. Sir Isaac Newton had brought the problem to an equation, but did not succeed in resolving the differential equation of the trajectory. Two particular cases of it were solved by the two Nicholas Bernoullis, the son and nephew of John. A better solution, though defective in point of generality, was given by Dr Taylor in the *Philosophical Transactions* of 1717; but it was left for John Bernoulli to supply this radical defect. This celebrated geometer succeeded, also, in the integration of several rational fractions, with which Taylor had endeavoured to perplex him.

The publication of Dr Taylor's method of increments gave rise to hostilities between him and John Bernoulli more serious than the war of problems in which they had been engaged. Taylor was charged as a plagiarist in the Leipsic Transactions for 1716. This anonymous attack from the pen of John Bernoulli was indignantly repelled by the English geometer, who accused his antagonist of having only altered and modified the solution of isoperimetrical problems, which were given by his brother James. Bernoulli again retorted under the concealed name of Buscard; but his reply was stained by a species of angry invective, and insulting raillery, which was unworthy of a philosopher.

In a dissertation on *Orthogonal Trajectories*, published as the joint production of John Bernoulli and his son Nicholas, they proposed the problem of reciprocal trajectories, which was for a long time discussed between John Bernoulli and Dr Pemberton. The friend of Newton carried on the controversy under an anonymous disguise; but he was unequal to a contest with such a formidable rival. Irritated at the success of Bernoulli, the English geometers assailed him in every quarter. Dr Keill challenged him to determine the curve described by a body when projected through a medium whose resistance varied as the square of the velocity. In a short time the exertions of Bernoulli were crowned with success; and though Newton had solved only the case where the resistance varied as the square of the velocity, the Swiss geometer determined the path of the projectile, when the medium resisted, according to any power of the velocity. Intoxicated with success, Bernoulli demanded the solution obtained by Keill, but when he found there was none to produce, he attempted to punish the presumption of the English philosopher, by the rudeness and severity of his wit.

The problem of Offenburgh, which consisted in determining on the surface of a sphere, curves whose perimeters could be expressed by algebraic quantities, had been tried in vain by Herman, (*Act. Petrop.* 1726); but John Bernoulli pointed out the error of Herman, and gave a general method for finding the curves required.

In the Memoirs of the Academy of Paris for 1730, he published his determination of the isochronous curve. In the same year, he carried off the prize of the Academy of Sciences, on the spheroidal figure of the planets, and on the motion of their aphelia; and in 1734, he shared the prize with his son Daniel, for a dissertation on the change of inclination in the planetary orbits; an occasion, as will be seen in the following article, which did not exhibit his character to the greatest advantage. His work on the management of ships, was published in 1718, and on this subject he was led into a controversy with Renau. In 1743, he collected together the various works which he had composed, and printed them at Lausanne, in four volumes quarto.

While our author held his professorship at Groningen, the university of Utrecht was solicitous to rank him among its members. His salary and appointments, however, were increased, and he continued in his office at Groningen, where a violent fever had nearly terminated his labours in 1704, till the pressing entreaties of his relations had almost induced him to return to Basle. The rumour of his departure incited the university of Utrecht to make another effort to obtain the benefit of his talents; and while he was hesitating what step to take, the death of his brother put an end to his irresolution. He returned to his native city, and succeeded his brother in the professorship of mathematics on the 17th of November 1705, where he delivered a discourse *De Fatis Novæ Analyseos et Geometriæ sublimis.* In this new situation he spent forty-two years of his life, which were zealously devoted to the discharge of his professional duties, and to the improvement of the mathematical sciences. He took an active share in promoting the objects of public instruction in his native city, and he had the honour of being twice rector, and nine times dean of the faculty of philosophy in the university of Basle. These professional labours he occasionally relieved by an epistolary communication with the first philosophers of the age; and he could number among his correspondents the names of Newton, Leibnitz, Marquis De L'Hospital, Euler, Maupertuis, Wolff, De Moivre, Mairan, Montmort, Renau, Tschirnhausen, Michelotti, Craig, Cheyne, Poleni, Cramer, Bulfinger, and Gravesende. His correspondence with Leibnitz is published in a work in two volumes quarto, which appeared in 1745, under the title of *Leibnitii ac Bernoulli Commercium Philosophicum et Mathematicum*, and which contains much curious information respecting that campaign of problems, in which these powerful combatants shone with such distinguished lustre.

Near the close of the year 1747, he was attacked with a disorder in the bowels, which was not however sufficiently violent to interrupt his usual studies; but on the last night of the year, the disease reached such an alarming height, that he expired on the morning of the first of January 1748, in the eighty-first year of his age.

John Bernoulli had nine children, three of whom, (viz. Daniel, the subject of the following article; John, who was doctor of laws and philosophy, and professor of mathematics at Basle; and Nicholas, who was professor of law at Bern, and afterwards professor of mathematics at Petersburgh,) inherited the genius of their father.

The talents of John Bernoulli as a mathematician were of the very first order; and if they were surpassed by any of his cotemporaries, the superiority could be claimed only by his brother and Sir Isaac Newton. He is represented by those that knew him, as just, sincere, and pious, possessed of much natural vivacity, and animated by a zeal and enthusiasm which often rose to extravagance.

In the angry contention which he carried on with his brother, we do not perceive any of those virtues which posterity can be called to admire. In the violence of his temper, and in the intoxication of success, we may find some apology for the vulgar sarcasms which he lavished upon Taylor and Keill; but the rude abuse which he poured upon a brother, superior to himself both in age and acquirements, and to whom he was indebted for all his mathematical knowledge, and the unnatural jealousy with which he viewed the rising reputation of his son, will long continue to cast a shadow upon his name, and must be permitted to remain upon record without either pardon or palliation.

During the whole of his life, he testified a sincere belief in the Christian religion, the doctrines of which he had studied with peculiar attention; and in a journal of the principal events of his life, which he left behind him, there are numerous expressions of the warmest gratitude for the kindness which the Almighty had shewn him. During his stay in Holland, his orthodoxy was called in question by the Dutch theologians; and he published several polemical dissertations in defence of his tenets, and particularly an apology *pro sua fâma, honore et religione*, which he pronounced as rector of the university. The controversy terminated in favour of Bernoulli; and the arm of the civil power was stretched out to silence his adversaries. (β)

BERNOULLI, Daniel, a celebrated mathematician and natural philosopher, was the son of John Bernoulli, and was born at Groningen on the 9th of February 1700. The attention of young Bernoulli was early directed by his father to the study of mathematics; but his first attempts, though promising and successful, did not obtain that encouragement and applause which a son might have expected from the fond partiality of a father. Having one day received a problem to resolve, he carried it into his closet, examined it with attention, and returned with the solution to his father, delighted with the success of his first efforts, and anticipating the praise which they deserved. Why did you not resolve it instantly? was the only answer he received; and the tone and manner in which it was spoken produced a temporary dislike to the mathematical sciences. Having refused to follow the profession of a merchant, to which he was destined by his friends, he entered upon the study of medicine, and went to Italy to perfect himself in that important science, under the care of Michelotti and Morgagni. His time, however, was
chiefly occupied with mathematical pursuits
returned to his native country loaded wit
honours, after having refused, at the age o
presidency of an academy which the republ
noa was about to establish. In the followin
accepted an invitation to the Academy of
burgh; and though he enjoyed, in this si
handsome income, his affections were perpet
on his native country: He therefore dete
leave Russia; but the court of St Petersburg
ling to suffer such a loss, increased his app
and settled upon him, during life, the half of h
with permission to retire. This generous
so seldom to be met with in the history o
induced Bernoulli to remain in Russia, till t
his health compelled him to return to the
Europe. In 1733, when he arrived at
residence of his father, he was appointed pr
medicine, and afterwards filled the chair o
and of speculative philosophy, which he he
same time.

The first work published by Bernoulli
in 1724, under the title of *Exercitationes*
Mathematicæ. This interesting productio
was printed in Italy with the approbation o
quisition, contained an able solution of the
equation of Ricati, and several ingenious ob
on recurring series, which conducted hin
years afterwards, to a new and elegant meth
proximation, for determinate equations con
an infinite number of terms.

His attention was next directed to mat
subjects, upon which he published several
and profound memoirs. In the Commenta
Petersburgh for 1726, he gave the most
demonstration of the parallelogram of forc
demonstration, though long and abstruse,
pendent of the consideration of compoun
and consisted chiefly in proving the absurdi
ry other supposition. His memoir on the
the centre of gravity, the centre of oscill
the centre of forces; his researches respe
oscillatory motion of a system of bodies pl
a flexible thread; and his determination of
tion and velocity of the two motions,—dis
nius of the first order, and have greatly co
to the advancement of theoretical mechan
papers on these subjects will be found in the
Petrop. vol. vi. p. 108.; vol vii. p. 162.
p. 189.; vol. xv. p. 97.; vol. xviii. p. 245

The problem of vibrating chords, which
tially solved by Taylor in 1714, and afterw
more general form by D'Alembert and
means of their new calculus of partial differe
the next subject that employed the geniu
noulli. He attempted to shew, that the
Taylor, though limited by the particular h
which he employed, was as general in its
that of D'Alembert and Euler, who had onl
rit of employing a new analysis. By consid
decomposition of the real motion of a st
the isochronous vibrations of the whole
its aliquot parts, he obtained a solution of
blem as extensive in its application as that
be fairly drawn from the methods of D'Ale

Euler. From this solution he afterwards deduced the lateral vibrations of an elastic rod fixed at one extremity; and investigated the vibrations of a column of air impelled with different degrees of force and velocity: and the results of his researches were found to accord with the most accurate experiments. His memoirs on these subjects will be found in the *Mem. Acad. Par.* 1762, p. 442. *Comment. Petrop.* tom. iii. p. 13, 62.; tom. xiii. p. 105, 167. *Nov. Com. Petrop.* tom. xv. p. 362.; tom. xvi. p. 257.

In the year 1746, Bernoulli discovered a new principle in dynamics, called the *Conservation of the momentum of rotatory motion*, of which he published an account in the memoirs of the academy of Berlin for 1746. The same discovery was made nearly about the same time by Euler and the Chevalier d'Arcy.

The only separate work of any magnitude which was published by Bernoulli, appeared in 1738, under the title of *Hydrodynamica, seu de viribus et motibus Fluidorum commentarii.* The theory of the motion of fluids having hitherto been treated in a vague and unphilosophical manner, it was reserved for Bernoulli to lay the foundation of a new theory, more conformable to experience. He supposed, that the surface of a fluid, discharging itself through an orifice, always continued horizontal; and that all the points of the elementary horizontal strata, into which the fluid mass is conceived to be divided, descend vertically, with velocities inversely proportional to the horizontal breadth of the strata to which they belong. By employing the principle of the conservation of living forces, he determined the motion of the strata with such elegance and address, that the Abbé Bossut pronounces the work which contains them to be one of the finest specimens of mathematical genius. A more direct theory, however, was afterwards given by Maclaurin and John Bernoulli; but it is to D'Alembert that we are indebted for a complete theory of the equilibrium and the motion of fluid bodies.

The curious and important subject of probabilities occupied much of Bernoulli's attention. After laying down a new principle instead of that which was employed by Fermat, Pascal, Huygens, and James Bernoulli, he applied it to the subject of innoculation, to the observations of practical astronomy, to the irregularities in the motion of time-pieces, and to some subjects of political economy.

Bernoulli had the high honour of gaining ten academical prizes, which he disputed with the most illustrious geometers of Europe. At the age of 24 he carried off the prize for the best construction of a clepsydra for measuring time at sea; and in 1754, he divided the prize with his father for the best explanation of the variation in the inclinations of the planetary orbits. His father could not conceal the mortification which he felt at being thus brought down to a level with his son. The love of glory was the ruling principle in his heart; and all the feelings of a father and a man were instantly extinguished when they came in competition with his reputation as a philosopher. The reproaches with which he loaded his son might have found some palliation in the irritability of his temper, when the judgment of the academy was first pronounced, but no apology can be offered for the permanency of a resentment so unnatural and unmanly. Never, perhaps, was there a case in the rivalry of talents that afforded such an opportunity for the finest exhibition of feeling, and for the noblest display of character; and never, perhaps, was there a case in which genius appeared in such an offensive and mortifying form. While the exultation of youthful genius ought to have been tempered in the one by filial regard, a paternal pride ought to have animated the other, and the father ought to have gloried in having transmitted to his son the full inheritance of his genius, without having impaired or resigned the original possession.

In 1740, Bernoulli divided the prize on the subject of tides with Euler and Maclaurin; and in this and the preceding dissertation he supported the Newtonian theory, which his father and his uncle had uniformly endeavoured to overturn. He carried off also the prize which was offered in 1743, for the best treatise on the mariner's needle. In 1747, he divided with an anonymous author, the prize for finding the time at sea when the horizon is invisible. His dissertation on currents gained the double prize in 1751; and in 1753, he was rewarded with the prize for the best method for supplying the action of the wind in large vessels. The last reward which he gained, was the prize for diminishing the rolling and the pitching of vessels, without injuring their other qualities. In the year 1748, he succeeded his father in the Academy of Sciences; and such was the extent of his fame, that he was elected a member of the Royal Society of London, of the Institute of Bologne, and of the Academies of Petersburgh, Berlin, Turin, and Manheim.

Though Bernoulli possessed a delicate constitution, yet the regularity of his life, and the serenity of his temper, exempted him from those diseases to which he might otherwise have been subject. During a long life of 83 years, he retained the complete use of all his faculties, and the last of his works exhibits the same profound genius which marked his earlier productions. For some years before he died, he withdrew himself from the fatigues of society, and associated only with a few select friends, with whom he had been long connected. The attack of an asthma, however, began to impair his strength, and at last carried him off on the morning of the 17th of March 1782, when he was found dead in his bed.

Daniel Bernoulli was distinguished in private life by his simple and unassuming manners, which were neither marked by false diffidence, nor affected austerity. He was charitable and humane without ostentation; and though his affairs were managed with that laudable economy which shuns the expenses of an idle vanity, he was never guilty of that avarice which some of his enemies have endeavoured to fix upon his name. Actuated by a love of peace, or warned perhaps by the fatal example which was exhibited in the conduct of his father and his uncle, his life was never embittered by those malignant dissensions which generally rage among men of genius. The humour which is occasionally displayed in some of his controversial writings, is a proof that the tranquillity which he enjoyed, was more the offspring of reason than of insensibility. Possessed of such qualities, the friendship of Bernoulli was courted by the wisest and the most virtuous of his fellow citizens; his advice even upon public affairs was implicitly followed; persons of all ranks in Basle bowed to him as they passed, and the first lesson which a father taught his child, was to pay the usual respect to the aged philosopher. The regard which he showed for religion, both in his writings and his conduct, might have saved his name from the unjust suspicion of infidelity; but it is the lot of genius and virtue to suffer this unmerited odium, and though Bernoulli knew that the orthodox ministers of Basle accused him of thinking too freely, he never attempted either to confirm or to repel their charges.

Although Bernoulli was not insensible to the high fame which he enjoyed, he often related to his friends two adventures, which he remembered with more pleasure than all the honours with which he had been loaded. When travelling with a learned stranger, who was much pleased with his conversation, his companion took the liberty of asking him his name. "I am Daniel Bernoulli," replied the philosopher. "And I am Isaac Newton," returned the stranger; who felt indignant that a man so young and so simple in his manners, should counterfeit the name of one of the greatest philosophers in Europe. On another occasion, when the celebrated Koenig was dining at his house, Koenig spoke to him with much self-satisfaction about a problem, which, after great labour, he had succeeded in resolving. Bernoulli continued to do the honours of the table, and before they rose from it, he presented Koenig with a solution more elegant than his own.

A more detailed account of the life and writings of Daniel Bernoulli, will be found in his eloge by the Marquis de Condorcet, and in the history of the different sciences which his genius has illustrated. (β)

BERRY, the name of a province of France before the revolution, which is now comprehended in the two departments of Cher and Indre; the former containing what was called Higher Berry, and the latter what was called Lower Berry. See CHER and INDRE. (j)

BERTIERA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (w)

BERWICK-UPON-TWEED, so called to distinguish it from *North* Berwick in East Lothian, is an English town of some importance, situated on the north side of the river Tweed, and within one mile of the sea; in N. Lat. 55° 16′ 40″, W. Long. 2° 3′ from Greenwich.

In Domesday-book, *Berwica* is used to denote a grange or farm village belonging to some town or manor; and is equivalent to *Bere-tun* or *Bar-ton*, still having that signification in Devonshire, and other parts of England. Chalmers, the learned investigator of Scots antiquities, hesitates between the former etymology and the Anglo-Saxon *Bar*, *nudus*, bare; and *Wic*, *vicus*, *castellum*, *sinus*; a village, castle, or curving reach of a river. See Chalmers' *Caledonia*, ii. 198, 199.

The river Tweed is navigable to this place, and although there is good depth of water close to an excellent quay, even at the lowest ebb, yet, from a bar at the mouth of the river, and a shallow called the ford at some distance below the quay, the port can only be entered by vessels of small draught. From the convenience of its harbour, Berwick enjoys a considerable coasting trade, and used to import timber, iron, and flax from Norway and the Baltic. But its principal dependence is upon the export, coastways, of large quantities of excellent salmon to London, sent fresh in boxes stratified with ice, and the distribution of the surplus farm produce of Berwickshire, Tiviotdale, North Durham, and the northern part of Northumberland, to other parts of the kingdom; having sometimes shipped in one year 60,000 quarters of grain, near 2000 packs of wool, eggs to the value of £20,000, and great quantities of salmon, the fisheries of which let for more than £10,000 yearly.

Berwick formerly belonged to Scotland, and was one of its *four* principal boroughs, the representatives of which, with the chamberlain of Scotland, formed a court for determining commercial questions. But it has been long annexed to England, along with a triangular territory reaching about four miles up the river Tweed, and nearly as much along the sea, containing from four to five thousand acres of useful farm land.

This place is governed by a mayor and four bailiffs, who constitute the sheriff. The mayor, recorder, and justices, or all who have been mayors, hold general and quarter sessions, and a court of gaol-delivery at one or other of the quarter-sessions, when necessary. The guild or corporation consists of the mayor and all the burgesses, nearly a thousand, in whom are all elections, and the entire management of a very valuable landed property within the bounds, the far greater part of which they divide among themselves, instead of applying to great and useful public purposes. In 1796, the population was estimated at 7930, and had probably doubled in the preceding 50 years; it is now somewhat above 8000, including a very small number of agricultural inhabitants in the liberties.

Berwick was regularly fortified on the old Spanish or Italian system, in the reign of Mary, Queen of England, and has five demi-revetted bastions, with double retired flanks, casemates, and cavaliers; but the ditch is very shallow, and has either never been revetted, or the counter-fort is now ruined and obliterated. The ruins of the ancient Scots fortifications, and of a very extensive castle, are still obvious. But in the present art of war, no fortifications around this place could ever be important, as it is every where closely surrounded by commanding eminences, and hollow ways reach almost up to the walls, forming natural approaches.

About the year 1770, in excavating a foundation in one of the streets of Berwick, called Hide-hill, considerable quantities of clay were dug out, which was intimately mixed with quicksilver in small globules, insomuch, that from one piece about the size of an egg, nearly a tea spoonful of pure quicksilver was collected. But before this discovery was made, most of the clay had been thrown away; and the mineral spot being situated in the middle of the town, it was not advisable to prosecute the search. (x)

BERWICKSHIRE. This county is situated at the south-east extremity of Scotland, on the shore of

Berwickshire.

the German or British ocean, and adjoins the north-east border of England, deriving its name from the town of Berwick-upon-Tweed, which was formerly its head borough or county town; but which has been long annexed to the crown of England, though still enjoying a species of anomalous jurisdiction in some measure separate from both kingdoms of England and Scotland. Berwickshire is bounded on the east by the German Ocean, and a part of the mouth of the Firth of Forth. It bounds on the north with East Lothian, mostly along the range of hills called Lammermoor, having, however, one parish to the north-east of these hills situated on the extreme south-eastern angle of the vale of Lothian. On the west, it joins partly with Mid-Lothian to the north, but principally with Roxburghshire. The southern boundary is formed by the river Tweed, dividing it from Roxburghshire on the west, Northumberland in the middle, and North Durham on the east: but a portion of Roxburgh in the neighbourhood of Kelso, and the township of Berwick, are both on the north side of this river.

Dunse, nearly in the centre of the shire, is its principal town, and is in W. Long. 2°, N. Lat. 55° 49′. The most easterly point where this shire joins Berwick township, is in W. Long. 1° 41′, and the western extremity in W. Long. 2° 34′. The most southern point on Tweed, is in N. Lat. 55° 36′ 30″, and the most northern in N. Lat. 55° 58′ 30″. The extreme length is 31¼, and the extreme breadth 19½ statute miles; and the entire superficies of the county extends to about 285,000 English acres, of which about 100,000 are arable, and 185,000 are composed of moors and hill pasture.

Anciently Berwickshire seems to have included a considerable portion of the lowlands of Roxburghshire, as the old castle of Roxburgh or Rokesburghe, was formerly known by the name of March-mount, in reference to the ordinary term of the Merse or March, by which the lowlands of this county are still known. Lauderdale was formerly a separate regality, or higher and almost independent jurisdiction, under the name of a bailliary; and was a detached domain belonging to the powerful family of the lords of Galloway, which ended in the inglorious John Baliol, and his gallant but unfortunate kinsman, John the *Red* Cumyn, who was slain by Robert the Bruce. Lammermoor is the north eastern hill district of this county; having Lauderdale on the west, and the Merse on the south and south-west. Besides these large divisions, the county is divided into three presbyteries, Chirnside, Dunse, and Lauder; and these are subdivided into thirty-one parishes.

The mountainous districts of Lammermoor and Lauderdale are of considerable extent, in which the general range runs inland from the sea at St Ebb's Head nearly west; but intersected by many narrow vales in various directions, chiefly tending towards the south, in which most of the streamlets flow; though the rivers of the vale land principally run from west toward the east. From the main range of hills, various spurs jut out towards the south; and there are several detached or isolated hills in different places of the vale of the Merse: And even that vale is much diversified by numerous swells and knoles, and winding deep dells, in which last the streamlets of the lower country flow in search of the larger waters and rivers. The northern sides of the Lammermoor hills are of considerable steepness, but belong to East-Lothian; while the southern slopes are generally moderate, and blend gradually into the lower vale. In many places the tops of the hills form extensive elevated table lands, which slope almost insensibly towards the south into the lower vales. The higher land is usually miserably bare infertile moor; while the slopes, called the moor edges, are mostly useful land, and sometimes of excellent quality. Two of the table lands are crossed by the principal great roads leading from Edinburgh to Berwick and Kelso; one at the Press inn, called Coldingham moor, once a royal forest; the other at Blackshiels. But the oryctology, or features of the county, have hardly been attended to in any survey of the country, and cannot be satisfactorily described by any person who has not carefully travelled the country for the express purpose. Clint-hill, at the north-west extremity of the Lammermoor chain, is said to be 1544 feet above the level of the sea. The general range may average about 1000 feet, declining as it approaches towards the sea and the east; and the whole terminates in three precipitous rocky promontories, at St Ebb's Head on the south, Earn's Cleugh in the middle, and Fast castle on the north. St Ebb's Head is detached from the extremity of the chain, by a deep narrow dry dell, almost level with high water-mark at spring-tides.

There is only one small lake or loch near Coldingham, of no moment. The Tweed, though it skirts Berwickshire in a winding course of forty miles, can scarcely be considered as belonging to the county, as no portion of its territory crosses that fine stream, and its rise is at a great distance in the west of Tweeddale or Peebles-shire. Whitadder and Blackadder are the principal rivers of the county, though the former rises in East Lothian; and both united run into Tweed near Berwick. Leeder or Leader, entirely belonging to and giving name to Lauderdale, runs from north to south, and falls into the Tweed at the south-west corner of the county. Eden, which rises at the west end of the Merse, runs into Tweed in that part of Roxburghshire which lies on the north side of this river, usurping, as it were, a valuable portion from the Merse, which probably, in ancient times, formed a part of the constabulary of Roxburgh Castle or Marchmount; a separate jurisdiction independent of the adjoining sheriffdoms. The Eye, a small water, or large burn, is the only stream of any consequence in the county which runs directly into the sea.

This is by no means a mineral district. The general run of the rocks and lower hills is composed of most irregularly stratified schistic stone, or hardened clay, with yolks of whin-stone, and quartz veins, mostly very thin and irregularly branching, but much mixed with a kind of steatitic half lapidified substance, called *leck* by the quarriers. In the higher muirs, there is a good deal of amorphous and splintery trap, or bastard whin-stone. In several places there are rocks of breccia, or coarse pudding-stone, many of which are in small fragments; but a remarkable instance occurs in the rocky cape or promontory covering Eyemouth bay on the north-east, which is composed of large nodules of whin and schist, of great varieties of size, form, and colour, imbedded in lapidified clay, somewhat like steatite, of various colours, often greenish, generally very hard and tough, but soapy to the feel. This stone is very durable, even when exposed to the stormy waves of the German Ocean, as is manifest both by the mother rock, and by Eyemouth outer pier, which has stood the raging of the sea uninjured for above thirty years. In many places there is abundance of stratified silicious sandstone, usually called free-stone, much of which is coarse grained, yet useful in building; though in some places it is found of very fine grain, and beautiful in colour and texture, standing the weather admirably. No coal has yet been found worth working in the county; and, indeed, the only seam yet discovered is at Lamberton, of which there are various rumours, none of which are worthy of being mentioned for want of full and authentic information. At Ordwell, on the Whitadder, an attempt was made, many years ago, to dig for copper ore, and the gallery or mine is yet open and accessible for a considerable way. The writer of this account could never procure any report on this subject worth listening to, and he only knows that it was abandoned long ago. Agricultural reports have now been procured of all or most of the counties and districts of our country; and it were perhaps worth national encouragement, to employ scientific mineralogists and geognosts to examine deliberately and to report upon the probability of our subterranean riches.

Berwickshire is noted as an agricultural district of peculiar excellence in its general system of management, which consists in judiciously blending together the cultivation of grain and grass alternately, or what is usually called the *convertible agriculture*. In this plan, a portion of every arable farm, usually about half, is in pasture, appropriated for the breeding and feeding of cattle and sheep; while the remainder is under arration, for the production of turnips, ruta baga, and hay, as winter provender for the stock, and grain of all the usual kinds for sale; and these are regularly and progressively interchanged. One remarkable excellence of this system, where it is not hampered by injudicious covenants in leases, is that in any turn of markets in favour of stock or grain, or the contrary, the farmers can suddenly take the advantage of the change by extending the branch which promises profit, and curtailing the other. But the limits of an article like the present does not admit of extending our remarks on this subject, which will be found detailed in the agricultural report of the county.

All farms in this county are held under regular leases, mostly for nineteen years endurance, sometimes more, but seldom in those recently granted, and a few shorter. By these the farmers stipulate to pay a certain money rent yearly, hardly ever a grain rent, and there are no personal services or bondages. The rental amounts paid by farmers must, of course, vary according to the value of the lands. But the farms taken within the last six years, in good situations as to manure and markets, and of tolerably good soil on the average, have been let at from one poun thirty shillings, two guineas, and even up to guineas and four pounds eleven and sixpence English acre; which, for the Scots, are respect £1 : 5 : 6, £1, 18 s. £2 : 13 : 4, £4, and £5 : 1 But there is every reason to suspect that at leas extreme rents in the foregoing enumeration are be the golden mean; especially considering that Ber shire contains no carse soil, and even, generally s ing, its soil is far from being of a deep and subst nature, except around towns and villages, having been manured since the cessation of the border before which most of it lay in waste pasture, or the miserable deteriorating system of lee and rig.

This is entirely an agricultural or rural di and has no manufactures worth mentioning, e that of paper; for which there are three mills i county. Broomhouse paper-mill near Dunse h eight vats; Ayton paper-mill five; and Chirns Allanbank paper-mill two. There is nothing can be called commerce at the only sea-port i county, Eyemouth; excepting that one corn chant exports coastwise from this place a goo of the surplus grain produce of the county; here likewise coals and lime are imported fo supply of the eastern inhabitants. Berwick st mains the chief commercial harbour of expo import for the whole county. There are fishing villages of small importance, the inhab of which are principally engaged in the white fi chiefly for the Edinburgh market. The fishery of the Tweed belongs principally to the ship of Berwick, and the opposite English sh that river; and the trade of salmon exclusive the London market, sent fresh and packed i centers entirely in that town.

In 1795, the rental of the county was esti at £112,000. In 1800, at £118,000. In 18 £210,000. And in 1808 for the property t 1807, at £226,000. One striking instance o progressive rise in the value of land is worth re ing. About sixty years ago, a farm of 300 E acres was sold for £950. Its progressive rents in successive leases of nineteen years, several of merged into new bargains before they exp £37, £50, £100, £400, and £615. It wa a few months ago for very near £20,000, t six or seven years of the last lease have to run during the whole period of sixty years, the la has been at no expense whatever in ameliorati improvements, neither does the farm possess a culiarly good soil, or any remarkable advantag cept nearness to market.

In 1755, by the returns made to the cele Dr Webster, the population of the count 24,946. In 1794, as made up for the Sta Account of Scotland, it was 30,875. And in under the population act, the numbers were 3 The diminution, only 346, may be more th counted for by the drain of men for the navy, and militia. Berwickshire contains $\frac{1}{57}$ of the extent of Scotland; $\frac{1}{52}$ of the population, $\frac{1}{51}$ valued rent; and pays $\frac{1}{19}$ of the real rent kingdom. In 1783, its whole taxes to the st

Beta
||
Bethesda.

This province was but partly subdued by the Romans, who had only one colony at Cœlia, now Kilia. Bessarabia is a Sandgiack or government, and the principal Sandgiack, who resides at Bender, has an annual revenue of three thousand pounds sterling. The principal towns are Bender, Ismail, Akerman, Kilia, and Kauscher. Bender is now the capital, though Kauscher was formerly the capital of the part of Bessarabia which belonged to the Khan of Tartary. (H)

BETA, a genus of plants of the class Pentandria, and order Digynia. See BOTANY. (*w*)

BETEL, an Indian plant of the genus *piper*, which is employed for the purposes of luxury and health among the oriental nations. The red juice which is pressed out of the leaves by mastication, renders the lips red, and the teeth black, and while it gives sweetness to the breath, it is said to strengthen the teeth and gums, and to be of great use in disorders of the stomach.

Every person keeps a box of betel, and presents it as we do snuff, as a mark of civility. It is often given as a present among the lower classes; and in parting with a friend, a purse of betel is generally presented as a token of remembrance. (Q)

BETHESDA, the Hebrew name of a pool or pond in Jerusalem, near the sheep market. Jo. v. 2—7. The word *κολυμβήθρα*, which in that passage is translated *pool*, signifies a reservoir of water, deep enough to allow a person to swim in it. Formerly there were two pools of that description in Jerusalem, near the mount on which stood the temple; the one called the upper pool, (2 Kings xviii. 7.) and the other the pool of Siloam by the king's garden, (Neh. iii. 15.) in which our Saviour directed the blind man to wash for the recovery of his sight. (Jo. ix. 7.) Some interpret the word Bethesda as signifying a *drain*, because the water used for washing the entrails of the beasts which were to be offered in sacrifice in the temple flowed into it; to which circumstance they very absurdly ascribe a medicinal quality of the pool. But Bethesda has, with greater propriety, been understood to signify *the house of mercy*, as expressive of the mercy of God to his people in the healing virtue which the water of that pool possessed. The five porches mentioned by John, are believed to be the remains of five apartments for the accommodation of the great multitude, who came to the pool to be cured of their bodily diseases. And Maundrell tells us, that when he was at Jerusalem, he saw what was supposed to have been the pool of Bethesda, contiguous on one side to St Stephen's gate, and on the other, to the area of the temple. "It is," says he, "one hundred and twenty paces long, forty broad, and at least eight deep; but void of water. At its west end it discovers some old arches now damm'd up."

"In these porches," says the Evangelist John, "lay a great multitude of impotent folk, of blind, halt, withered, waiting for the moving of the water. For an angel went down at a certain season into the pool, and troubled the water: whosoever then first, after the troubling of the water, stepped in, was made whole of whatsoever disease he had." Whether the miracles performed at the pool of Bethesda, were confined to the season of the particular feast men
in v. 1st, as the words *κατα καιρον* in v. 4th
seem to imply; or whether these words, tak
more enlarged sense, may be explained to signi
the water had its sanative quality at other Jew
tivals, cannot be ascertained. That it had n
quality at all times, but only at certain times
an angel went down and *troubled*, that is, ag
the water, is clear from the words of the Eva

In order to account, in a natural way, for
native quality of this pool, Hammond suppos
the water became medicinal in consequence of
pregnation from the blood and entrails of th
fices, conveyed thither by the water in whic
were washed at the temple; and that by the
who troubled the water, we are not to underst
angel, but only a *messenger*, probably a ser
the high priest, who might be sent at a pa
season to agitate the pool. But that explan
evidently contradicted by the narrative of the
gelist. The Greek word translated *angel*, i
used in the sense which that interpretation g
and is evident, that had there been no divine a
the virtue of the water would have been confine
cure of some particular disorder, and would ha
found in the water at one time as well as at a
the very reverse of which John tells us was th
It cured all, but it cured only one person
time, namely, the person who first stepped in
the water was agitated by the descent of an
Of whatever use, therefore, this pool might ha
in the earliest ages, certain it is that He, whi
sovereign physician of soul and body, made us
in the days of the Saviour, for the cure of dis
a way which must have convinced men that the
were effected, not by a natural, but by a mir
operation. For the true reason, why the virt
communicated to the water, by the descent of
gel, was effectual for the cure only of one pe
one particular time, was to manifest the mir
nature of the cure. Tertullian informs us, t
water of this pool ceased to be beneficial to th
upon their obstinate perseverance in their r
of Christ's divine mission; another proof tha
rived its healing quality directly from the ag
the Divine Being, and lost it at the precise tim
that divine agency was withdrawn. We may
fore conclude with the learned Dr Macknig
Bethesda obtained its miraculous healing qua
honour of the personal appearance of the Son
upon earth. See *Ant. Univ. Hist.* vol. ii. 44
x. 544. Maundrell's *Journey to Aleppo*,
Stackhouse's *Hist.* vol. v. p. 393. Calmet'
(A. F.)

BETHLEHEM, a city of Judah, gener
led Bethlehem of Judah, or Bethlehem Ephr
distinguish it from another Bethlehem in Z
Neither eminent for the number, nor the weal
inhabitants, it became famous by being the
place of the royal Psalmist, hence emph
named the city of David; but still more so, b
chosen by Providence to give birth to the Sa
the world. For that reason, though now red
the size of a village, it has always been regar
place of high renown; and at present can bo

variety of useful knowledge; that he was remarkable for his intimate acquaintance with sacred scripture, a readiness in producing, and a felicity in explaining, the most suitable passages on all occasions; that his writings are distinguished by a truly primitive and apostolical character, and by a rare unity of gravity and simplicity; that he was remarkably diligent, regular, and earnest in every part of his pastoral duties; and that, the higher his preferments, the more watchful and exemplary he became in the whole of his conduct, the more laborious and zealous in advancing the honour and interests of religion. He was an able and active opposer of the principles of popery, and one of the framers of the English liturgy. He bequeathed the greater part of his property to charitable purposes in his native village; and to the societies for propagating the gospel, and for promoting Christian knowledge. See *Biog. Britannica. Biog. Dictionary*. Noble's *Continuation of Granger*, vol. ii. *Guardian*, vol. i. N° 74. Felton's *Dissertation on reading the Classics*, &c. p. 190. Nelson's *Life of Bp. Bull*, p. 75. (*q*)

BEVERLEY, a well built town of England, in the East Riding of Yorkshire, situated near the river Hull. The minster of Beverley is a large and handsome edifice. The market place contains about four acres, and is decorated with a beautiful cross, supported with eight free-stone pillars, which was erected by some of the members sent by the town to Parliament. Beverley carries on a considerable trade in malt, oat-meal, and the tanning of leather. In the common connected with the borough, is a mineral spring, which has proved of some service in diseases of the skin. Number of houses 1228. Population 5401, of whom 521 were returned as employed in trade and manufactures. (*j*)

BEVIEUX, a village of Swisserland, celebrated for the salt springs in an adjacent mountain. A gallery, about six feet high and four broad, is cut into the mountain, through a black rock veined with gypsum. The springs rise in a solid rock, and the richest of them yields 28 per cent. of salt, while the poorest gives only ½ per cent. Only a few cubes of rock salt have been found in the mountain, though it abounds with saline particles. Several sulphureous springs, containing a little salt, and flaming by the application of a lighted candle, occur near the salt springs. Rocks of white gypsum, with a mixture of bluish clay, are also found in their neighbourhood, as in the salt mines of Northwich in Cheshire. "After travelling in this subterraneous passage," says Mr "Coxe, near three quarters of a mile, I observed a great wheel of 35 feet diameter, which raises the brine from the depth of about 70 feet. From this place is a shaft 300 feet high, which is cut through the mountain to the surface, for the purpose of introducing fresh air. I noticed, too, reservoirs hollowed in the solid rock for holding the brine; one was 160 feet square, and 9 in depth. Since my first expedition to these pits in 1776, the workmen had pierced the rock 25 feet deeper, and cut a gallery 100 feet in length. They had also begun to form a third reservoir, to contain 5500 cubic feet, which was nearly half finished. The brine deposited in these reservoirs, is conveyed by means of 2000 pipes, about a league to Bevieux, where the salt is extracted. The brine pits near Aigle contain only from 2 to ½ per cent., and yield annually about a third as much as those of Bevieux, or about 5000 quintals. The salt is much whiter and heavier than that of Bevieux, and consequently bears a higher price. These, which are the only salt-works in Switzerland, scarcely yield a net yearly profit of more than £3000, and furnish only one-twelfth of the annual consumption of the cantons. The remainder is procured chiefly from France, which by treaty provides the Swiss States with this commodity at a moderate price. Indeed, so high is the tax upon salt in that kingdom, that even the French salt is sold two-thirds cheaper in Switzerland than in many parts of France. The ordinary price of common salt throughout the canton, is three halfpence per pound." See Coxe's *Travels in Switzerland*, vol. ii. p. 104. Letter xliii. Bevieux is three miles south of AIGLE. (*w*)

BEWCASTLE, a village of England, in the county of Cumberland, situated on the river Line, remarkable for some Roman antiquities, and a famous obelisk decorated with figures in bas-relief, and containing a Roman inscription. A particular account of these ancient relics will be found in Hutchinson's *History of Cumberland*. (*j*)

BEWDLY, or BEAULIEU, a town of England, in Worcestershire, finely situated on a declivity on the banks of the river Severn, over which there is a bridge erected by Edward IV. A curious hermitage, with a chapel and several apartments, is hollowed out of the beautiful rock at the edge of the water. The manufactures of Bewdly chiefly consist in tanning, malting, and horn-work, and it carries on a considerable trade in malt, leather, salt, and iron ware, by means of the Severn, which is here navigable. Number of houses 787. Population 3671, of whom 939 were returned as employed in trade and manufacture. See Nash's *History and Antiquities of Worcestershire*. (*j*)

BEY, or BEGH, the name of an inferior officer in the Turkish empire, who governs one of the seven sandgiacks into which each province of that empire is divided. See TUNIS, TURKEY, and Sonnini's *Travels*, p. 424.; Browne's *Travels in Africa*, p. 47.; and Volney's *Travels*, vol. i. (*j*)

BEYKANEER, a province in the north-east of Hindostan, bounded on the south by Joudpore; on the south-west by Jesselmere; on the west by the Desert; on the north by the country of the Batnians; on the east by Hurrianah; and on the south-east by Jypore. Its width from east to west is about 80 coss, and its length, from north to south, 120 coss. The soil of this province is very unproductive, excepting near some of the villages at its eastern boundary; but even there the labour of the husbandman is scarcely repaid. Hence the inhabitants are obliged to import from their neighbours rice, corn, sugar, salt, opium, &c. In consequence of the rapid absorption of the rain in the sandy soil, the inhabitants are obliged to dig pits for the preservation of the water, which are generally 100 and 200 feet deep, and sometimes even 300. Every family has a cistern of this kind; and sometimes the drought is so great, that whole families are compelled to emigrate.

ıt-Sing, the rajah of Beykaneer, has absolute
r over the lives and properties of his subjects.
ssipating the treasures of his ancestors, he has
ssed his subjects with the most cruel exactions;
obliged to maintain his power by an army of
infantry, 3200 cavalry, and 30 pieces of artil-
Though he has several Europeans in his ser-
his invasions of the Batnians and of Churoo
generally been unsuccessful. The revenues of
rovince are about three lacs of rupees, though
um has been sometimes doubled by imposts
the merchandise which pass through the coun-
This rapacity, however, has forced the merchants
ry their goods by a different route. (H)

YKANEER, the capital of the province of
ıneer, is a large and well built town, surround-
a wall. About an English mile to the south-
f the town is situated the fort, which is the re-
e of the rajah. It is a strong place, encircled
ı wide and deep ditch. This place, however,
s it chief security from the *disette* of water in
ighbourhood. (H)

ZA, Theodore, a celebrated French reform-
s born of noble parents, at Vezelai, in Burgun-
the 24th of June 1519. His uncle, who was
llor of the parliament of Paris, took the charge
during his infancy, and sent him to Orleans in
to be instructed by Melchior Wolmar, under
he continued about seven years, and made ra-
ogress in the various branches of polite litera-
When Wolmar returned to Germany, his na-
untry, in 1535, Beza was sent to study law at
ıs; but he preferred the cultivation of classical
g, and employed a considerable portion of his
ı the composition of verses. In 1539, he took
ntiate's degree, and went to Paris, where he
ovided with two good benefices. He succeed-
to the benefices of his elder brother; and his
the Abbe de Froidmond, had promised to re-
s abbey to him, which was worth 15,000 livres

In such opulent circumstances, Beza was
ly tempted to continue in the Catholic faith,
ı he declares, that he never gave up the resolu-
abandoning it. Having been afflicted with a
ous illness, he renewed his vow to profess the
ed religion; and as soon as he had recovered
nt strength, he fled to Geneva, along with a
hom he had formerly promised to marry, and
in that city on the 24th October 1548. In
lowing year he accepted of the Greek profes-
at Lausanne, where he continued nine years
g the duties of his office, and occasionally
lectures on the New Testament to several
refugees who resided in that town. In con-
e of an assembly of 400 Protestants having
ırprised and taken prisoners at Paris in 1557,
along with Farellus and John Budeus, went
puty to some of the German princes, to beg
tercession with the court of France in behalf
persecuted Protestants; but he returned to
ne, without having completely gained the ob-
his mission. Desirous to devote himself whol-
ivinity, and actuated by other motives which
imself declines to mention, he left Lausanne,

Beza.

and returned to Geneva, where he became the colleague of Calvin, both in the church and the university, and co-operated with that zealous reformer in promoting the great objects of the Reformation. At the earnest solicitation of some of the leading men in the kingdom, Beza was invited to Nerac, to convert the king of Navarre; and, at the desire of this prince, he assisted at the conference of Poissy. His speech before this assembly was received with the utmost attention, till he declared, "that the body of Jesus Christ was as distant from the bread and wine, as the highest heaven is from the earth." At this sentiment the prelates murmured, and made a noise: Some of them exclaimed, *Blasphemavit!* others left the assembly; and the Cardinal de Tournon requested the king, either to silence Beza, or to permit him and the other ecclesiastics to withdraw. The king however refused to interfere, and Beza concluded his able and intrepid harangue.

At the desire of Katherine de Medicis, Beza remained in France. After the massacre of Vassi, on the 1st of March 1562, he was deputed to complain of this violence to the king; and, during the civil war which ensued, he attached himself to the Prince of Conde, and was present as a clergyman at the battle of Dreux. After the confinement of the Prince of Conde, Beza lived with Admiral de Coligni, till his return to Geneva, after the peace of 1563. In 1568, he went to Vezelai, to settle his father's affairs, and to attempt the conversion of his sister, who had retired to a convent. In 1571, he again went to France, to assist at the synod of Rochelle, where he was elected moderator; and, in 1572, he was present at the synod of Nismes, where he opposed the introduction of a new discipline, proposed by the party of John Morel. In 1574, the Prince of Conde invited him to Strasbourg, to go on a mission to Prince John Casimir, administrator of the palatinate. In 1586, he was engaged in the conferences of Montbeliard, and in those of Bern in 1588. Having lost his wife, he married, during the same year, a widow, who survived him. In consequence of a report raised by the Jesuits, that Beza was dead, and had professed on his deathbed the Catholic religion, he wrote verses full of vigour against that body; and in the year 1600, he wrote a *votiva gratulatio* to Henry IV. His health now began to decline, and he died on the 13th of October 1605, and was buried in the cloister of St Peter.

It is difficult to discover the true character of Beza amidst the gross calumnies of the Catholics and the exaggerated encomiums of his own party. He has been accused of hypocrisy, infidelity, murder, and crimes that cannot even be named; but there is every reason to believe, that these charges were the malicious inventions of his theological opponents. It does not appear, however, from a careful examination of the life of Beza, that he was distinguished by that untainted purity and irreproachable conduct that we would wish to admire in the character of a reformer.

Beza was the author of numerous works in theology, of which his Latin translation of the New Testament is the principal. His Juvenal Pieces were published at Paris in 1597, under the title of *Theod. Bezæ Poemata Varia.* See Anton. Fayus *De Vita et Obitu Theod. Bezæ;* and Bayle's *Dict.* (π)

BEZIERS, the *Biterræ* of the ancients, a city of France, in the department of Herault, beautifully situated on a declivity near the junction of the great south canal and the river Orbe. The objects chiefly deserving of notice are—its cathedral; its college, founded in 1599; its academy of sciences and belles lettres; its ancient wall, flanked with old towers and bastions; and the remains of a Roman amphitheatre. Its principal manufactures are cloth, fustians, silk stuffs, brandy, and distilled spirit of wine. Beziers was once a populous and flourishing city; but in 1209, during the crusade against the Albigenses, no fewer than 50,000 of its inhabitants were put to the sword. Within sight of Beziers there are eight sluices of the superb canal already mentioned, which form a cascade 156 toises long, with a declivity of 11 toises. The soil around Beziers is the best in the department. Population 14,211. E. Long. 3° 12′ 33″, N. Lat. 43° 20′ 41″. (Q)

BEZOAR, the name of a calcareous concretion found in the stomach of a species of goat, or, according to others, in individuals of the antelope genus. It derives its name from the Persian *pazar*, a *goat*, or from the Persian *pazachar*, from *pa*, against, and *zachar*, a poison, the bezoar stone having long been regarded as an antidote against poison, and, in short, as an universal medicine. Dignified with such inestimable virtues, bezoar stones, when only an ounce in weight, have sometimes been sold in India for 100 livres; and their value increased with their magnitude, according to a very rapid progression. In the centre of the oriental bezoar, which is composed of smooth concentric lamina, of an olive colour, is generally found, in a nucleus, pieces of straw or hay, small stones, hard seeds, &c. but most commonly the pod of a particular kind of fruit.

The occidental bezoar is more rough in its surface than the oriental, and has sometimes been found in the camel tribe. The specific gravity of the oriental bezoar is 1.666, and that of the occidental 2.233. (H)

BEZOUT, STEPHEN, a celebrated French mathematician, was born at Nemours, in the department of the Seine and Marne, on the 19th of March 1730. His attention was accidentally directed to the study of mathematics, by some elementary works on geometry which fell into his hands, and by the perusal of Fontenelle's Lives of the Academicians, from which he saw, that tranquillity and glory were the high rewards of a successful study of the sciences. The youthful ardour which was thus inspired was at first checked by the opposition of his father; but every restraint was found to be unavailing, and Bezout was at length permitted to give his undivided attention to the study of geometry.

Before he had reached his 28th year, he presented to the Academy of Sciences two memoirs on the integral calculus, in consequence of which he was appointed adjunct mechanic on the 8th of April 1758. In the first of these memoirs he determined the form of similar functions, in which the variable quantities are connected by an equation, and which, multiplied by constant factors, and added together, become algebraically rectifiable; and in the second memoir gave the general equation of rectifiable curves. I these memoirs the fame of Bezout was so much e tended, that in the year 1763, the Duke de Chois appointed him examiner to the marine, and request him to draw up a course of mathematics for the u of those destined for the navy. In 1768, he w chosen associate to the Academy of Sciences, a member of the Marine Academy; and upon t death of Camus, he succeeded him as examiner to t royal corps of artillery. In 1779, he published h General Theory of Equations; a work on which had laboured with unremitting assiduity since t year 1762. During these researches, Bezout o tained a solution of a particular class of equations all degrees. This method, which was entirely ne was general for equations of the third and fourth o der, and became particular in equations of the fif degree. By means of several new theorems on th calculus of finite differences, he discovered a gener method for the extermination of unknown quantitie by which he was enabled to avoid the tedious a complicated calculations which would otherwise hav been necessary, and to determine beforehand the for and degree of the final equation. His Course of Ma thematics for the Marine was completed in 6 vo 8vo in 1764; and in 1770, he finished his Course f the Corps of Artillery, in 4 vols 8vo. These el mentary works have passed through several edition and have been used in a great number of seminari as peculiarly adapted for initiating the young in t elements of mathematics. The private studies Bezout were greatly interrupted by the nature of h public duties. The examination of the marine a artillery schools, and the frequent journies which was on this account compelled to take, occupi much of his time; but harassing as these duties mu have been to a man of genius, they were discharg by Bezout with the most unremitting assiduity, a with the utmost tenderness and affection for his pils. During an examination at Toulon, two of h pupils were prevented by the small-pox from atten ing it publicly. In consequence of this misfortu their progress would have been retarded a whole ye had not Bezout, at the risk of catching the infecti examined them in their own apartments. Thoug the attention of this able writer was chiefly direct to geometry, he found leisure to study mineralo and several branches of physics. He was the fi who gave any acconnt of the crystallized stones Fontainbleau, of which more full and recent accou have been given by M. de Lasonne.

Bezout married when he was very young, and wa the father of a family whom he rendered happy by his domestic virtues. Fond of retirement and study, his manners were reserved and cold, and his conversation marked by no uncommon qualities; but the warmth and sensibility of his heart were apparent to those who knew him well, and the natural sagacity and extensive knowledge which he possessed were displayed only to his particular friends. The regular and abstemious life which he led, held out to him the prospect of a long life; but the fatigues of his public duties, the severity of his private studies, and the bitterness of personal chagrins, triumphed *et concinnata;* Veronæ, fol. Among the observations of Bianchini, those upon Venus are very singular; and we are much at a loss whether to consider them as absolute fabrications, or as the result of optical illusions which he had not the sagacity to discover. The disadvantages attending the use of the long refracting telescopes were considerably, though not altogether, removed by the contrivance of Huygens, by which tubes were rendered unnecessary. In 1712, Bianchini brought to Paris a contrivance of his own for the same purpose, which was described in the memoirs of the academy for 1713. With long telescopes, to which this invention was adapted, he seems to have observed Venus with unremitting assiduity. He perceived, or thought he perceived, seven large spots towards the middle of her disc, which communicated with one another by four straits; and towards the extremities of her disc he observed other two spots, which had no communication with the former. He saw even promontories or projections of these dark regions into the lighter part of her disc. In imitation of Riccioli, he called those spots and promontories after eminent men, among whom were, the king of Portugal, Galileo, Cassini, Columbus, Vespucius, Magellan, and several Portuguese generals who had distinguished themselves by their conquests in the Indies. From the change of position in these spots, Bianchini concluded that Venus revolved about her axis in 24 days 8 hours. It is a very remarkable circumstance, that the admirable telescopes employed by Herschel and Schroeter have never yet been able to discover any of these spots perceived by Bianchini; and we are the more inclined to suspect some great source of error, as it is now proved, by the accurate observations of Cassini, Herschel, and Schroeter, that Venus revolves about her axis in a little less than 24 hours, instead of 24 days, as Bianchini determined. For farther information respecting the life of this author, see his Eloge in the *Hist. Acad. Par.* 1729; in the *Nouvelles Literaires de Leipzig*, Jan. 1731; and in Fontenelle's *Eloge des Academiciens*, in the *Œuvres de Fontenelle*, tom. vi. p. 213. See also La Lande's *Voyage d'Italie*, tom. iv. p. 311, edit. 1786. (*o*)

BIBERACH, an ancient city in the Confederation of the Rhine, belonging to Baden, situated in a valley traversed by the river Reiss. It was formerly a free and imperial city, under a government similar to that of Augsburg. The paper and the fustians manufactured in this place have been long celebrated. The cold bath of Jordan is very near the town. Population 6600. E. Long. 10° 2′, N. Lat. 48° 4′. (*j*)

BIBLE. See CHRISTIANITY, SCRIPTURES, and THEOLOGY.

BIBLIOGRAPHY, (from βιβλος, *a book*, and γραφω, *to write*,) a name which has been recently employed by many continental writers to comprehend every thing that relates to books; and as every branch of knowledge is contained in books, they have, by a strange process of reasoning, employed the word BIBLIOGRAPHY to denote a science which comprehends all the other sciences. M. Peignot has preferred the more general term of *Bibliology*, which he divides into seven different heads, viz.

1. GLOSSOLOGY, or the knowledge of langu
2. DIPLOMACY, or the knowledge of writin
3. BIBLIOPEIA, or the composition of books
4. TYPOGRAPHY, or the knowledge of print
5. BIBLIOPOLY, or the knowledge of books
6. BIBLIOGRAPHY, or the knowledge of bo
7. UNIVERSAL LITERARY HISTORY.

These various heads are branched out in
numerable subdivisions, embracing every subj
which the human mind has ever been directed.
have accomplished such a task, with even tol
success, would have required the universal pow
a Bacon or a D'Alembert; but when it has be
ecuted by one who does not pretend to a know
of the sciences, our readers may well con
what a mass of bad arrangement has been
together under the sacred and dignified name
science.

In arranging the books of a library, it is cer
necessary to follow some general division of
knowledge, but it would be neither proper nor
nient to adopt that scientific classification whi
sults from a perfect acquaintance with the sci
and the various relations by which they are co
ed. This subject will naturally come under ou
sideration in the article LIBRARY; and und
word BOOKS, we shall lay before our readers th
formation which some of them might have ex
to find under the present article. (*w*)

BIDEFORD, a market and sea-port to
England, in Devonshire. It is situated chiefly
slope of an eminence on the banks of the river
ridge, a little above its junction with the Taw,
falls into Barnstaple bay. The streets are clea
the houses well built, though they are chiefly
structed of timber, brick, and mud. The q
conveniently situated near the centre of the
and at high tides will admit a vessel of 500 tons.
river is crossed by a stone bridge of 24 irr
arches, built about the middle of the 14th ce
Bideford carried on a great commerce with New
land about the middle of the last century. It still
a considerable trade in the importation of fish
Newfoundland, and the salt with which the he
are cured is brought from Liverpool and Warrin
but the vessels belonging to the port, which a
to nearly 100, varying from 20 to 250 tons, are
cipally employed in the carriage of coal and ti
and in the exportation of oak and bark to Sco
and Ireland. Large quantities of earthen war
manufactured here and sent to Wales. Numb
houses 582. Population 2987, of whom 325
returned as employed in trade and manufactures.
Watkin's *History of Bideford*, and Maton's *T*
through the Western Counties. (*j*)

BIDENS, a genus of plants of the class *Syn*
nesia, and order Polygamia Æqualis. See BOTA
(*w*)

BIENNE, a town of France in the department
of the Higher Rhine, and formerly the capital of a
district of the same name in Switzerland. It is si-
tuated at the foot of Mount Jura, near the northern
extremity of the lake of Bienne. The town is built
in the ancient style; and is chiefly remarkable for its
tanneries, its manufacture of printed cloths, and its

inexhaustible source of water, which supplies the pipes of 60 public fountains. A large common between the town and the lake, belonging to the burghers, is laid out in small kitchen gardens.

The lake of Bienne, which is of an oval form, is nine miles long and four broad. Its margin is decorated with villages and castles, and affords many beautiful and picturesque views.

The lake of Bienne is celebrated by the island of St Peter, which was the temporary residence of Rousseau when he withdrew from Moitier. The island of St Peter is about two miles in circumference; on its southern side it slopes gently to the lake; but in other directions it is steep and rocky. Large oak, beech, and chesnut trees, decorate its gently undulating surface, which is traversed by agreeable walks, terminating in a circular pavilion in the centre of the island. Parties from Bienne, Nidau, and the surrounding country, resort in the time of the vintage to this enchanting spot, which has been rendered classical by the short residence of Rousseau. This singular character lived in the farm house, the only one in the island, which belonged to the steward of the general hospital at Berne, to whom he paid 40 shillings per month for his board and lodgings. He remained here only two months, and the room that he occupied, from which there is a fine view of the glaciers, is shown to strangers as an object of curiosity. A full account of the ancient district of Bienne, which is now included in the department of the Higher Rhine, and a more particular account of the lake, may be seen in Coxe's *Travels in Switzerland*, vol. i. p. 210, 211, &c. and vol. ii. p. 152. See also *Dict. de la Suisse*. (π)

BIEQUAL THIRD, in music, is a name given by Earl Stanhope, in his *Principles of the Science of Tuning*, to an interval, two of which added to a major third make up an octave, consequently two of them is equal to a minor sixth; and its ratio, in his Lordship's monochord system, is $\frac{\surd 10}{4}$, $=207\frac{1}{2}\Sigma+4f+18m$ (see Plate XXX.;) this exceeds the perfect IIId by $10\frac{1}{2}\Sigma+m$, $\doteq\frac{21}{22}c$ nearly: the logarithm of this biequal third is .8979400,0867; and it may be worthy of remark, that it exceeds a minor third by $L+\frac{1}{2}\Sigma$, and is $\frac{1}{2}\Sigma$ larger than a deficient flat fourth.

In the *Equal-beating* system of his Lordship, that is, where his two successive thirds, composing a true minor sixth, are made to *beat equally quick*, two other biequal thirds arise, having finite ratios, the largest of which is $\frac{15}{19}$, whose logarithm is .8973376,5811; and the smallest has a ratio of $\frac{12}{24}$, whose logarithm is [illegible]985423,5924; whence it appears, that one of these is larger and the other smaller than the monochord biequal third, first described; circumstances of which the noble Earl seems not to have been aware, any more than that two of such successive biequal thirds produce *no beating between the two beatings*, which his Lordship last proposed, as the mode of tuning his *equal beating* intervals, *Phil. Mag.* xxviii. 151.) are *not equal* to each other in any case whatever. The theorems whence the above ratios were deduced, and whence those of his Lordship's triequal [illegible] and others may be deduced, will be given under the article EQUAL-BEATING *Intervals*, which see. (c)

BIENNIAL PLANTS. See GARDENING.

BIGAMY. See POLYGAMY.

BIGGLESWADE, a town of England, in the county of Bedford, situated in a fine valley on the banks of the Ivell, which is here navigable. It has one of the largest markets in England for barley, pease, and oats, and there is also here a small manufactory of thread lace and edgings. Several old houses were thrown down in this town by an earthquake, which was felt on the 25th of February 1792. Number of houses in 1801, 301. Population 1650, of whom 258 were returned as employed in trade and manufactures. See *Beauties of England and Wales*, vol. i. (j)

BIGNONIA, a genus of plants of the class Didynamia, and order Angiospermia. See BOTANY. (w)

BIGORRE, the name of a district in Guyenne, one of the former provinces of France, but now included in the department of the Upper Pyrenees. See PYRENEES, UPPER. (j)

BIJORE, the name of a mountainous province of Hindostan. Its history is devoid of interest, and we have no statistical information respecting it that is worth communicating. See Rennel's *Memoir*, p. 159. (w)

BIJUGA, or BISSAGOS ISLANDS. The western coast of Africa, between the River Gambia and the Rio Grande, consists of a chain of low fertile islands, separated from each other, and also from the continent, by narrow navigable canals, in consequence of the sea encircling them. To the south-west of these islands is an archipelago, consisting of 18 or 20 islands, stretching above 40 leagues from north-west to south-east, called the Bijuga Islands, bounded on the one side by immense shoals, which, being little known, are frequently fatal to navigators; and on the inside by a channel, about five leagues in width, called the Bijuga channel. Neither the exact limits of these islands, however, nor their number, are definitely ascertained; but thirteen are said to be inhabited. We are disposed to consider them a separate and distinct groupe from those on the north-east side of the channel, though other geographers rank the latter along with them.

The Bijuga channel is deep, and is fit for the navigation of the largest vessels; it stretches nearly 50 leagues in length, and terminates with the island Bulama. The islands gradually rise from the shore towards the interior; none are above six leagues in length, nor any where appear to be above 40 feet higher than the level of the sea. Some navigators consider them of volcanic origin; others think that they are alluvial, and that they have been formed, in the course of time, by the deposit of the Rio Grande and the neighbouring streams, on the extensive sand banks which serve for their base. The Bijuga islands are rich and fertile, abounding in all the necessaries of life, beautiful, and well wooded, whence they have long been recommended as suitable for European settlements. Warang, also called Formosa, Cazegoot, Canabac, Bulama, Carashe, and Suoga, which was peopled but lately, are those of principal note. The three immediately north-west of the channel, Jattes, Bassis, and Bissao, have usually been added to their number, though, as we have said, we think they should be separated from them. See BISSAO.

The people inhabiting the Bijuga islands are said to be originally Papels, a tribe still dwelling on the continent: they are above the middle size, muscular, bony, well proportioned, and have the appearance of great strength and activity. Their noses are flatter, and their lips thinner, than those of the neighbouring tribes; their teeth, which they sometimes file to a sharp point like a saw, are good; and their hair is woolly. They cut their hair into many fantastic forms, and always dress it with red ochre and palm oil. They wear little clothing; a scanty girdle, and, in the colder season, a goat's skin thrown over the shoulders of the men, being their only covering: That of the women is equally simple, consisting of a girdle, six inches deep, of the shred of the palm leaves, which forms a thick fringe.

The Bijugas are a brave and warlike race; they are never at peace with the surrounding nations; and their chiefs, being endowed with uncommon intrepidity, are always to be dreaded. Captain Beaver describes one of their kings, with whom he had intercourse while on the island of Bulama. "Bellchore is the dread of the neighbouring people, and is reckoned the greatest warrior that the Bijuga nation ever produced. He still boasts of having set fire to the town of Bissao, notwithstanding its strong fort and numerous garrison; and to others he will probably boast of his triumph over us at the western point of Bulama. He is old, but upright and active, and stands full six feet high; his large black eyes, the fire of which seventy rains have not yet extinguished, are the most penetrating I ever beheld; his nose is large and projecting; his teeth regular and white; his limbs are well proportioned; his understanding is clear and acute; and in body and mind he stands preeminent among his countrymen. But his courage, his policy, his restless activity, his daring enterprizes, and his love of war, which have rendered him the admiration of his own countrymen, have procured him, at the same time, the hatred and detestation of all those nations that lie within the reach of his lawless expeditions." Only a few days of the year are devoted by the Bijugas to their rude agriculture, in preparing the ground for rice; all the rest are occupied in war and hunting. Their arms are a long buccaneer gun, a spear, and a Solingen sword about four feet in length, and literally as sharp as a razor; while in the left hand is carried a round convex shield, formed of witheys interlaced, covered with the hide of a buffalo. The Bijugas perfectly understand the use of arms, and pride themselves in keeping them in the most perfect order. Captain Beaver relates, that their aim is so sure that they seldom miss their object, and that he had seen a spear, from the distance of twenty yards, strike a reed about ten inches long, and as small as a tobacco pipe; he likewise witnessed their extreme expertness at the broad sword. In war, after discharging their guns kneeling, and throwing them down, they cast their spears, and then have recourse to the sword. They approach in a squatting posture to the attack, while the shield nearly covers the wholy body. Its convex form and strength are so well adapted for turning aside the shot of an enemy, that a musket ball will not pierce it. In 1696, the Portuguese took 300 Bijugas into their service, to aid an expedition against the Balantes, anothe tribe of Africans; but not anticipating the rain season about to commence, their arms were render unserviceable, and they were defeated with great los Their war canoes are of considerable size; fortunate ly for their less enterprising neighbours, they do no understand the use of sails, which is more surprisin as the vessels visiting their islands are provided wit them.

The Bijugas, in common with most African na tions, are cruel and treacherous, always ready seize advantages, and to overpower strangers. Tho who have intercourse with them cannot be too muc on their guard; whence ships repairing to the Bijuga islands, for the purposes of traffic, never allo more than the crew of a single boat to come o board, and even then the guns are primed and match-lighted. About 30 years ago, the crew of a Frenc vessel, wrecked on the island of Yoko, were a massacred or led into captivity. The inhabitant of another island likewise endeavoured to seize M Delajaille, when surveying the coast, as Labarth informs us, and mortally wounded one of his companions. More recently they treacherously cut o some of Captain Beaver's people, and would have e fected his own destruction, had not his personal i trepidity, and a fortunate concurrence of circu stances, oftener than once prevented it. It has bee asserted, that suicide is common among the Bijuga and that the smallest chagrin will prompt them leap into the sea, or terminate their existence with dagger.

All the Bijugas are idolaters; they offer propiti tory sacrifices, and put implicit faith in divinatio If they form a treaty with a stranger, or are abo to undertake a warlike expedition, they sacrifice cock, from inspecting the gizzard of which concl sions are drawn of good or evil omens. M. Bru the French governor-general of Senegal, having a chored off the isle of Cazegoot, was visited by near relative of the king, with whom he carried o conversation, and supplied him with brandy, a l quor which these people will make every sacrifice t obtain. Meantime a canoe from the island arrive and one of the natives came on board, holding cock in his left hand, and a knife in his right. A ter kneeling before M. Brue, he arose and turned t the east; then cutting the animal's throat, he sprink led a few drops of blood at M. Brue's feet, and a terwards performed the same ceremony at the mas and pump, which being finished, he presented th cock to the French commander. When M. Bru inquired into the meaning of the ceremony, the tive told him, that the wise men of his country vie ed the whites as the gods of the sea; and that th mast was a divinity which made the vessel wal while the pump was a miracle raising the water whose nature it was to fall down. The Bijugas lik wise firmly credit the efficacy of gris-gris, or ch which consist of certain sentences of the Koran wri ten on paper by the Mandingo priests: They are ne ly sewed up in cloth, or leather, and attached to

of the body. A lucrative traffic is car-
hese gris-gris, which the fabricators will
r whoever wears them invulnerable; and
one accidentally escape an impending evil,
reparing the charm is esteemed far supe-
of his fraternity.

is carried on in the Bijuga archipelago,
mall vessels from the Portuguese settle-
ssao, and the English to the southward,
d hides. The slaves being prone to re-
mmit acts of desperation, commanders of
liged to take more than usual precaution
them; for, on the slightest neglect, the
nurder them, seize the vessel, and run her
. Delajaille gives a list of all the articles
the Bijuga islanders.

en so peculiarly the interest of the Portu-
pel all strangers from that part of the
res, that other nations are very imperfect-
d with the history of the native tribes.
hile a Frenchman, named Delafond, was
h the isle of Cazegoot, the natives stole
property: A favourable opportunity of
immediately occurring, by the arrival of
ip of war, he induced the commander to
him in pillaging the whole island. Ac-
00 men were landed, who invested the
burnt the king in his hut; but, except
lve, the whole population, consisting of
00 people, fled to the woods, and escaped
inary invaders. The French, however,
ress afterwards to conciliate the natives,
on a friendly traffic with them. More
ng the projected settlement of Bulama,
aver, in 1792, made an amicable treaty
the kings, from whom he purchased that
quantity of goods. See Beaver's *Afri-*
randa. Durand's *Voyage to Senegal.*
Voyage au Senegal. (c)

O, originally *Belvao*, or the Good Ford, is
Spain, and the capital of Biscay Proper.
ntly situated on the Bay of Biscay, at the
the river Ausa, which is navigable for
bao was built in 1300 by Diego Lopez
The houses are high and well built, with
roofs, which shelter the pavement below
n and rain. The streets are paved with
e stones, and are kept remarkably clean
y means of several canals which convey
from the river. In this town there is a
ny, several docks for building merchant
r parishes, three convents of nuns, one
two asylums. There is here a highly de-
nenade, called the Arenal, which stretch-
bank of the river, and is planted with
dens, and bordered with warehouses, gar-
ouses adorned with paintings. In time of
ort is frequented by vessels from England,
olland, Bremen, and Hamburgh, which
productions of their manufactures and co-
export the wool of Old Castile, the an-
uipuzcoa, some rigging, iron, and ches-
nerally imports about 160,000 quintals of
d 6000 barrels of train oil. There were
umber of tan-yards here, but of late they have considerably diminished. The air is extremely damp, though the town seems to be healthy. The town contains about 200 mercantile houses. Number of houses 1200. Population 15,000. See Laborde's *View of Spain*, vol. ii. p. 356; and Bourgoing's *Travels in Spain*, chap. i. (π)

Bile, Biledulgerid.

BILE. See ANATOMY, CHEMISTRY, and PHYSIOLOGY.

BILEDULGERID, an appellation given to one of the divisions of Northern Africa; but which has been continually varying in the extent of its application. It was understood by the older geographers, to comprehend all the countries formerly known by the name of Numidia; and was described as including the southern part of Algiers, with the whole tract of land between that kingdom and Egypt. It has been confined by De Lisle to a province called Biledulgerid Proper, situated to the south of Tunis, but properly speaking, under the government of that state, from which it is separated by a ridge of high mountains. In several later maps, however, and especially by the modern Arabs, the name Biledulgerid is applied to the whole of that district which lies between the maritime states of Barbary and Sahara, or the desert; which extends from 10 degrees west to 15 east longitude; from 29 to 33 north latitude; and which comprehends Lower Suse, Dara or Draha, Taflet or Tafilelt, Sigilmessa, and Biledulgerid Proper. The word has been analysed by some authors into Bled-el-Jerid, "the land of dates;" by others, into Bled-el-Jeraad, "the land of locusts;" but Dr Shaw, who writes it Blaid-el-Jeride, and Mr Jackson, who makes it Bled-el-Jerrêde, unite in giving it the interpretation of "the dry country." The country, especially in the central regions, is sandy, barren and mountainous, and almost entirely destitute of rivers and fresh water springs. In the districts nearer to the Atlantic, water may generally be found by digging three or four feet below the surface, but it is of a brackish taste, and unwholesome quality. The climate is extremely hot and unhealthy; especially in the months of July, August, and September, when a suffocating wind, loaded with particles of sand, and extremely pernicious to the eyes, blows very tempestuously from the desart. In many parts of this extensive tract, very considerable ruins are to be found, from which it would seem to have been formerly better peopled, and more carefully cultivated; but now its principal and almost only produce is dates, which grow every where in the greatest variety and abundance; though, in some spots of the more western provinces, a little Indian corn, rice, wheat, and barley, are produced: In these also a very superior breed of goats are reared, which are in high repute among the inhabitants of Morocco. The natives of Biledulgerid are chiefly composed of wild Arabs, who come originally from Sahara, and who resemble the wandering tribes, already described under the article BARBARY. Those of them who border upon the northern states, are rather more civilized and stationary in their habitations, frequently engaging in agriculture and the mechanic arts; but the inhabitants of the interior are a set of miserable and murderous banditti: They are a meagre, swarthy race, with shrivelled complexions, and almost continually afflicted with ophthalmia. Their principal food is the fruit of the date tree, the indigestive effects of which they are accustomed to correct by the use of dried fish. They use also camels milk, and goats flesh; and, on account of the intolerable heat, their principal meal is always after sun-set. They are extremely liable to a most inveterate scurvy, which affects their gums, loosens their teeth, and sometimes spreads over their whole body. In other respects, they are said to be vigorous and healthy, living to a very advanced age, and seldom subject to sickness and disease. The small-pox, and even the plague, the great scourges of Barbary, are said to be unknown in Biledulgerid, though the countries are so contiguous, and the inhabitants have so much intercourse. The natives are chiefly employed in predatory excursions, in serving occasionally as mercenaries under the neighbouring states, and particularly in hunting the ostrich, which supplies them with various necessaries. The flesh is used as food, the fat as medicine, the claws as ornaments; the skin is made into pouches, and the feathers constitute their most valuable article of traffic. All these Arabs profess the religion of Mahomed; but have little knowledge of its tenets, or regard to its precepts; and mix with it an endless variety of Jewish ceremonies, and Pagan superstitions. See *Mod. Univ. Hist.* vol. xvii.; and Jackson's *Account of Morocco*. (*q*)

BILL. See EXCHANGE.

BILL. See PARLIAMENT.

BILLIARDS, from the French BILLARD, which comes from *bille*, a ball, is a game of skill, which was originally invented by the French, and is now much in practice among all civilized nations. The apparatus necessary in this game is a billiard table, which is a rectangular table about 12 feet long, and six feet wide, placed in a horizontal position, and covered with green cloth, and surrounded with cushions, a cue, a mace, and ivory balls. At each of the angles, and in the middle of the two longest sides, is placed a hole, net, or pocket. The cue is a thick piece of wood several feet long, tapering gradually to a point about half an inch in diameter. It is held by the fore finger and thumb, and is laid over the left hand to strike the balls. The mace, which is chiefly used in this country, is a long straight rod of wood, with a head at one end, made either of bone or ivory. It is held by the small end, and the ivory ball is struck with the other. The object of the player is to make his adversary's ball roll into one of the holes, either by striking it directly by his own, or by making his own ball rebound from the sides of the table, and then strike his adversary's ball, so as to carry it into one of the holes. When a ball is thus put into one of the holes, it is called a hazard, which is reckoned for two in favour of the player.

In order to play billiards well, attention must at first be paid to the method of holding the mace; to the position in which the player should stand, and the manner of delivering the ball from the mace; but these are much more easily acquired by observation, or by the direction of a good player, than by written rules. A person who plays with his right hand must stand with his left foot foremost; and, on the contrary, he who is left-handed, must place his right foot foremost, by which he will stand more stea
and firm.

There are various games at billiards; viz. the whi
winning game; the white losing game; red, or c
rambole winning game; the red losing game; t
simple carambole game; the winning and losing c
rambole game; the bar-hole game; the bricole gam
the caroline game; the choice of balls game; t
commanding game; the cushion game; the doubl
game; the four game; the hazards; the limit
game; the one hole game; the Russian carambol
and the fortification billiards: an account of each
which we shall give from Hoyle.

Rules and Regulations to be observed at the Wh
Winning Game, played with two White Balls.—T
game scored from winning hazards is twelve in nu
ber when two persons play, and fifteen when four pl
1. String for the lead, and the choice of ba
2. When a person strings for the lead, he should sta
within the limits of the corner of the table, and m
not place his ball beyond the stringing nails or spo
and the player who brings his ball nearest the cushi
at the upper or baulk end of the table, wins the le
3. After the first person has strung for the lead,
the adversary who follows should make his ball tou
the other, he loses the lead. 4. If the player ho
his own ball, either in stringing or leading, he lo
the lead. 5. If the leader follows his ball with eit
mace or cue past the middle hole, it is no lead; a
if his adversary chuses, he may make him lead agai
6. The striker who plays at the lead, must stand w
both his feet within the limits of the corner of t
table, and must not place his ball beyond the strin
ing nails or spots; and his adversary (only) is boun
to see that he stands and plays fair, otherwise t
striker wins all the points he made by that strok
7. After a hazard has been won, the balls are
be separated, and the striker is to lead as at firs
When a hazard has been lost in either of the corne
holes, the leader is obliged (if his adversary require
it) to lead from the end of the table, where the haza
was lost; but if the hazard was lost in either of t
middle holes, it is at the leader's option to lead fro
either end of the table he pleases. 8. If the strik
does not hit his adversary's ball, he loses one poin
and if by the said stroke his ball should go into a ho
over the table, or on a cushion, he loses three poin
viz. one for missing the ball, and two for holing
&c. and he loses the lead. 9. If the striker holes
adversary's ball, or forces it over the table, or o
cushion, he wins two points; but when he holes ei
his own ball, or both of them, or forces either or b
of them over the table, or on a cushion, he loses
points. 10. No person has a right to take up
own ball without permission from his adversary.
If the striker should touch or move his own ball,
intending to make a stroke, it is deemed an a
dent; and his adversary may put the ball back to
place where it stood. 12. If the striker forces
adversary's ball over the table, and his advers
should chance to stop it, so as to make it come on
table again, the striker nevertheless wins two poi
13. But if the same events happen to his own b
the striker loses nothing by the stroke, and he
the lead: because his adversary ought not to sta

the way, or near the table. 14. If the striker misses the adversary's ball, and forces his own over the table, and it should be stopped by his adversary, as before mentioned, he loses one point, but retains the lead, if he chuses. 15. If the striker, in playing from a cushion, or otherwise, by touching the ball, makes his mace or cue go over or past it, he loses one point; and if his adversary requires it he may put the ball back, and make him pass the ball. 16. If the striker, in attempting a stroke, does not touch his ball, it is no stroke; and he must try again. 17. If when the balls are near each other, and the striker by accident should make his ball touch the other, it is nevertheless a stroke, though not intended as such. 18. If the striker should make his adversary's ball go so near the brink of a hole, as to be judged to stand still, and afterwards should fall into the hole, the striker wins nothing; and the ball must be put on the same brink where it stood, for his adversary to play for the next stroke.—N. B. There is no occasion for challenging the ball if it stops, as some persons imagine. 19. If the striker's ball should stand on the brink or edge of a hole, and in playing it off he should make the ball go in, he then loses three points. 20. If a ball should stand on the brink or on the edge of a hole, and should fall into the same, before or when the striker has delivered his ball from his mace or cue, so as to have no chance for his stroke, in that case, the striker's and his adversary's balls must be placed in the same position, or as near as possible thereto, and the striker must play again. 21. The striker is obliged to pass his adversary's ball, more especially if he misses the ball on purpose; and the adversary may oblige him to place his own ball where it stood, and play until he has passed. 22. If the striker touches his own ball twice, or plays both balls from his mace or cue, so that they touch at the same time, it is deemed a foul stroke; and if discovered by his adversary, and a dispute should arise thereon, he has an undoubted right to appeal to the disinterested company then present; and the marker, if required, after desiring silence, must go round the table to each person separately, and be particularly careful to ask, if he has any bet depending thereon, if he understands the game, and the nature of the dispute then in question; and if determined by the majority of the disinterested company, and the marker, if needful, to be a foul stroke, then it is at the adversary's option (if not holed) either to play at the ball, or take the lead. But if his adversary shall not discover it to be a foul stroke, then the striker may reckon all the points he made by the same, and the marker is obliged to score them. 23. No person has a right to discover to the player whether the stroke is fair or foul, until asked by him, or by him or his partner in a match of four. 24. If by a foul stroke the striker should hole his adversary's ball, he loses the lead. 25. If by a foul stroke the striker holes his own or both balls, or forces his own or both balls over the table, or on a cushion, he loses two points. 26. If the striker plays on a ball when it is running or moving, it is deemed a foul stroke. (See art. 22.) 27. If the striker plays with both feet off the floor, without the permission of his adversary, it is deemed a foul stroke. (See art. 22.) 28. If the striker plays with a wrong ball, he loses the lead, if his adversary requires it. 29. If the balls should be changed in a hazard, or on a game, and it is not known by which party, the hazard must be played out by each party with their different balls, and then changed. 30. If the striker plays with his adversary's ball, and holes or forces the ball he played at over the table, &c. it is deemed a foul stroke. (See art. 22.) 31. If the striker plays with his adversary's ball, and holes or forces the ball he played with over the table, &c. he loses two points; and if he misses the ball he plays at, then he forfeits three points. 32. If the striker plays with his adversary's ball, and misses, he loses one point; and if his adversary discovers that he has played with the wrong ball, he may part the balls, and take the lead. 33. In all the before-mentioned cases of the striker playing with the wrong ball, (if discovered) his adversary must play with the ball the striker played at throughout the hazard, or part the balls, and take the lead. 34. Whoever stops a ball when running, loses the lead, if his adversary does not like the ball he has to play at the next stroke. (See art. 22.) 35. If any one retains his adversary's cue or mace when playing, it is deemed foul. (See art. 22.) 36. If the striker stops or puts his own ball out of its course, when running towards a hole, and adjudged by the marker, and the disinterested company then present, to be going into a pocket, if he missed the adversary's ball he loses one point; and if going into a hole by the same stroke, three points. 37. If any player stops or puts his adversary's ball out of the course when running towards or into a hole, or puts his adversary's ball into a hole, it is deemed a foul stroke, (See art. 22.); and he is also subject to similar penalties as stated in article 36. 38. He who shakes the table when the ball is running, makes it a foul stroke. (See art. 22.) 39. He who throws his mace, cue, or stick upon the table, so as apparently to be of any detriment to his adversary, makes it a foul stroke. (See art. 22.) 40. He who blows on the ball when running, makes it foul. (See art. 22.) And if his own ball was running towards or near the hole, he loses two points. 41. He who leaves the game before it is finished, and will not play it out, loses the game. 42. Any person may use either mace or cue, or change them in playing, unless otherwise previously agreed on; but when the parties agree to play mace against cue, the mace-player has no right to use a cue, nor has the cue-player any right to use a mace during the game or match, without permission. 43. When a person agrees to play with the cue, he must play every ball within his reach with the point of it; and if he agreed to play with the butt, he has no right to play with the point without permission: and also when agreed to play point and point of the cue, neither of the parties has a right to use a butt during the game or match, without leave, &c. but they have each a right to play with the point of a long cue over a mace, &c.; and likewise when the parties agree to play all point with the same cue, they have no right to use any other during the game or match. 44. Whoever proposes to part the balls, and his adversary agrees to it, the proposer loses the lead. 45. Two missings do not make a hazard, unless it is previously agreed on to the contrary.

46. In all cases, the betters are to abide by the players on the determination of the hazard, or on the game; and the betters have a right to demand their money as soon as their game is over. 47. Every person ought to be very attentive, and listen for the stroke before he opens the door of a billiard room. 48. The striker has a right to desire his adversary not to stand facing nor near him, so as to annoy or molest him in the stroke; and if he is impeded by his adversary, or any spectator, he has a right to strike again. 49. Each party is to attend to his own game, and not to ask—If his adversary's ball be close?—If he touches his ball?—If he can go round the ball?—nor any like question; nor is any person to be set right, if going to play with the wrong ball. 50. Spectators should stand from the table, and give room for the players to pass round. 51. The parties who play ought to be particularly careful and attentive to the hazard or the game, more especially when any bets are depending upon it; for even if they play carelessly, the bets must be decided by their strokes. 52. No person in the room has a right to lay more than the odds on a hazard or on a game. But should appeal to the marker; or to the table of the odds, which ought to be hung up in the billiard room for inspection. 53. Each person who proposes a bet, should name the sum, and likewise be very careful not to offer a bet when the striker has taken his aim, or is going to strike, lest it may disturb or interrupt him; and no bet ought to be proposed on any stroke (at the losing game especially) that may be supposed to have any tendency to lessen or to influence the judgment of the player. 54. If any bets are laid on the hazard, and the game is eleven, and the striker loses the game by a miss, and should afterwards go into a hole, it cannot be a hazard, the game being out by the miss. 55. If A proposes a bet which is accepted by B, it must be confirmed by A, otherwise it is no bet. 56. When four persons play, each party may consult with and direct his partner in any thing respecting the game, &c. and the party who misses twice before a hazard is made, is out, and it is his partner's turn to play; but if, after the two missings have been made by the party, his adversary should hole a ball, so as to make a hazard at the stroke following the said two missings, yet the party who did not make the two missings is to play, as he cannot be supposed to be out, who has not made a stroke

White losing game.

White Losing Game, played with two white Balls.—The game is twelve in number, the points of which are reckoned by losing and double, or winning and losing hazards.

When a person is tolerably well acquainted with the winning game, he should then learn the losing game (the reverse of the winning,) which is a key to billiards in general. It depends entirely upon the defence, and the knowledge of the degree of strength with which each stroke should be played, either to defend or make a hazard: for if a person who has a competent knowledge of the game should not have a hazard to play at, he must endeavour to lay his own ball in such a position, that his adversary may not have one to play at the next stroke. For a losing game, hazard is much more easy to be made, when well understood, than a winning game hazard general. For an account of the rules, see F Games.

The White Winning and Losing Game is bination of the two preceding; and all the ba in by striking the adversary's ball first, reck wards the game.

Red or Carambole Winning Game, playe three Balls, two white and one red.—The g 16 or 18 in number, formed from winning and caramboles.

There are two methods of playing this gam by the players striking alternately, in which th ber of points is usually 16; the other wh players follow their successful strokes, and t points are 18: the latter mode is now generall

The red or carambole winning game is full riety; and there being so many chances in it, make it a game of great uncertainty, the odd are not calculated, but bets are generally laid ing to fancy, or to the custom of the table they are usually played at. For the rules, see

Red or Carambole Losing Game, played wit Balls, two white and one red.—The game is 18 in number, as in the red winning game, sco caramboles, losing and double hazards.

The red or carambole losing game requires g judgment than the winning, and depends mat on the skill of the player; the chances in it may pen sometimes to vary more than at the winnin rambole game, and especially if the players d properly understand the skilful part. For the r see *Hoyle.*

The Simple Carambole Game, played with t Balls, as in the others.—The game is 12 in num arising from caramboles and forfeitures.

This game, possessing very few chances, requi both skill and judgment, and is seldom played but generally by able proficients against the winnin and losing, or the winning game of novices, conside ed equal to giving 15 out of 24 points. It is als played two different ways; in one the hazards los, i the other they are not reckoned; the first mentioned is the customary method, where the striker, upo making a hazard, loses as many points as he, by that stroke, would have gained in either the winning or losing game. For the rules, see *Hoyle.*

The Winning and Losing Carambole Game, play with three Balls, two white and one red.—The ga is 21 or 24 in number, reckoned both from winning and losing hazards and caramboles.

This game, now very frequently played, is, agreeable to its title, a combination of the foregoing red winning and losing carambole games, and to which all the rules and regulations, both for the white and red games, are applicable, except where any of them may happen to be contradictory to another, and then the rules for the winning games are to have the preference.

The Bar-hole Game.—This is so styled because the hole which the ball should be played for is barred, and the player strikes for another hole. When this is played against the common game, the advantage to the last-mentioned is calculated at six points

The Bricole Game.—Bricole signifies being rebo

a cushion, from whence the ball is to re-
to hit that of the adversary, reckoned
ng eight or nine points. When both
ricole, the game is ten scored from bri-
and forfeitures.

ne Game.—This is played either on a
re table with five balls, two white, one
lue, and the caroline ball yellow. The
be placed on its usual spot, the caro-
ly in the middle of the table, and the
een the two at the lower end of the
striking spot is at the upper end, in a
vith the three balls. The game is 42
aramboles and hazards; the red hazard
the blue two, and the yellow, when
caroline or middle pocket, is reckoned

Balls Game.—In this game the player
ll each time, an incalculable advantage
ed against the losing and winning game.

anding Game.—At this game the ad-
pon the ball which the striker is to
ned equal to having 14 points out of
iven by a skilful player against the com-
an indifferent one.

n Game.—This game consists in the
g his ball from the top of the baulk
d of following his stroke upon the
generally played in the winning or win-
g game, reckoned equal to giving six

et Game.—This game is ten in number,
wo balls, most commonly against the
game, and no hazard is scored unless
erberation from the cushion, calculated
to giving five points.

Game, consists of two partners on each
the common games, who play in suc-
very winning hazard lost. See rule 56
Winning Game.

rds.—So styled as depending entirely
of hazards, no account being kept of
persons may play at a table with balls
bered, though, to avoid confusion, sel-
n six play at once. The person whose
pays a fixed sum for each hazard to the
who misses pays half the same to him
played at. The only general rule is,
y ball a hazard for the next player,
st be done by always playing upon him
next, and either bringing his ball close
n, or putting it at a distance from the

d Game is very seldom played. In it
divided by a line, beyond which, if the
his ball, he pays forfeit.

le Game.—All balls that go into one
ted at this game, and the player who
all at the brink of that particular hole,
tage. The lead should be given from
e table where the last hazard has been

n Carambole.—This game varies from
arambole in the following particulars:
ll is to be placed upon the usual spot; but the player, at the commencement of the game, or after his ball has been holed, is at liberty to place it where he pleases. The leader, instead of striking at the red ball, should lay his own gently behind it, and the opponent may play at either of them. If the said opponent plays at and holes the red ball, he scores three; then the red ball is to be replaced upon the spot, and the player may take his choice again, always following his stroke till both balls are off the table, he gains two points for every carambole; but if, in doing that, he holes his own ball, then he loses as many as he would otherwise have obtained; and if he strikes at the red ball, caramboles and holes that ball and his own, he loses five points; and when he holes all three balls he loses seven, which respective numbers he would have won had he not holed his own ball.

Billiards.

Fortification billiards.

Fortification Billiards.—First, there are ten wooden forts, in the form of castles, which are loaded with lead, so that they may keep their places. In the front of each fort, at the bottom, is an arch to admit the ball, which is to be put through it to attack the fort, and within each arch a small bell is hung. Secondly, the pass through which each of the adversary's attacking balls must pass, before a fort can be taken. Lastly, the grand batteries, and ten flags or colours.

Two of the forts, called the grand forts, are to be made larger than the rest, and to have an arch cut through them of the same size as the others. Five of the forts, including one of the grand forts, one of the batteries, and five of the flags or colours, are usually painted red, and the forts and battery like brick-work, which denotes them to be English; on each fort one red flag is to be hoisted on the centre of its front. The other five forts, grand fort included, battery, and colours, are to be of a white colour; the forts and battery to be painted with black like stone, are called French, and one white flag to be hoisted on each.

The pass, which serves for the purpose of both parties attacking balls to go through, is to be made in the form of the grand forts, but rather longer for distinction, and to have an arch of the size of the grand forts, and painted of different colours, viz. one of the ends where the arch is, of a red, to continue half way of each side, and the same on the top; the other end of the arch is to be white, and to continue in the same colour over the other half. There are likewise two flags to be hoisted on the pass, viz. one red and the other white; the red to be hoisted at the English, and the white at the French end. The pass is to be placed in the centre of the table, the red end facing the English, and the white end the French forts.

The limits of each party's quarter is from the end cushion, where his forts are placed, to his pass on each side of the table. The English forts are to possess one end of the table, called the English quarter, and the French forts the other end, called the French quarter. The two forts in each quarter in the first angle from the pass are to be taken first, and are called the advanced forts. The two forts in the second angle are to be taken next, which are called the reserved forts. Lastly, the grand fort, with the battery placed before it, is the last to be taken.

The height of the advanced and the reserved forts is to be 5½ inches, the breadth and length of the advanced forts 5 inches to the square, and the length of the reserved forts are 5½ inches, and the back of them to be rounded off. The height of the grand forts is to be 5½ inches, the breadth and length 6¼ inches. The batteries are made in a triangular form, the height of them are 3 inches, the breadth at the extremity are 2¼ inches, and the length 3¼ inches. The height of the pass is 5½ inches, the breadth 6¼ inches, and the length 7 inches. The height of the concave in the forts where the attacking ball must enter, is 3 inches, the breadth 2¼ inches, and the depth 2¼ inches.

The bell which is to be within the arch in each fort, must be hung 1¼ inch within it.

The balls which are to be played with at this game, are to be 1¾ inch diameter.

Rules. *Rules*—The game is twenty in number.

1. The player who strikes the opposite cushion, and brings the ball nearest the cushion he struck from, shall have the first stroke, and also the English side of the forts, and must begin the attack. 2. Each party has one attacking, and two defending balls. 3. The balls are placed on the spots, the attacking ball in the middle, and the defending balls on each side of it. 4. The ball for the attack, on the English side of the forts, must be spotted with red, and the defending balls with small black circles. 5. The ball for the attack on the French side of the forts must have white, and the two defending balls eight black spots on each. 6. Before you can attack any of the forts, you must make the pass. 7. When the pass is made, you must take down your adversary's colours, and then attack either of his advanced forts, which must be taken first. 8. If after you have made the pass, you do not take down your adversary's colours, you must make the pass again from your own side of the forts; but you must not return to the spot. 9. If you take either of your adversary's forts, after you have made the pass, and have not taken down your adversary's pass colours; you lose two points, and must return to your spot again. 10. After you have regularly made the pass, as in art. 7. and have taken a fort, you must return to your middle spot again. 11. When you have taken a fort, you win 4 points. 12. If you do not take down your adversary's colours when you have taken his fort, you must take the said fort again, and must be put back those four points you won by the same. 13. Missings at this game reckon nothing. 14. After you have regularly made the pass, you are not obliged to go through it again. 15. In each fort there is a bell, which gives notice at being taken. The bell must be made to ring, otherwise the fort is not taken. 16. The besieged may defend his own forts, or may send his attacking ball into the besieger's quarter to attack his. 17. The besieger must take his adversary's forts with his attacking ball. 18. If the besieger should take his adversary's fort with either of his defending balls, he loses two points, and returns to his spot. 19. If the striker plays with either of his adversary's balls, he loses two points, and if he played on either of his own balls, that must be put on its proper spot again, if his adversary requires it. 20. Either party may sen his defending ball or balls into his adversary's quarter. 21. After having taken the two advanced fort you must take the two forts in the next angle, whic are called the reserved forts; and lastly, the gran fort. 22. He who does not take the forts accor ing to the above direction, and takes either of th last for the first, loses two points, and must retu to the proper spot. 23. After a fort has been take or a ball holed or forced over the table, the strik is bound to place the ball on its proper spot; an if he does not, he shall reckon nothing for any fort &c. he shall take during the time the ball is out o its place. 24. After having taken a fort, either b storm or otherwise, if the adversary takes the bal out of the fort, though he does not take down hi colours, nevertheless the said fort is deemed as taken, and the colours are to be taken down. N. B. Taking a fort by storm is, when the party having made his utmost effort finds it so well defended by his adversary, that he is obliged to have recourse to stratagem, that is, by laying his ball in a proper angle and striking the ball against the end cushion, an bringing the ball back again into his adversary's for 25. If the striker force either of his adversary's ball into his own fort which has not been taken, he make him a prisoner of war, and wins six points. 26. the striker force either of his adversary's balls in his own fort which has been taken, it is no prison of war, but the said striker wins two points. 27. the striker forces either of his adversary's balls in his adversary's fort, he wins two points. 28. If t striker holes any of his adversary's balls, for ea ball so holed he wins two points. 29. If the strik holes his own ball or balls, for each ball so holed loses two points. 30. If the striker force his a versary's ball or balls over the table, or on a fort cushion, for each ball he wins two points. 31. If t striker forces his own ball or balls over the table, & he loses two points for each ball. 32. If the strik forces his adversary's ball over the table, or on a fo or cushion, or into a hole, and regularly takes adversary's fort by the same stroke, he wins points. But if by the same stroke the striker's b should go into a fort which has been taken, or is o of the angle, he loses two points. 33. If the strik holes his own or his adversary's ball, or forces the over the table, or on a fort or cushion, he loses tw points. 34. If the striker forces his ball into an of his own or adversary's forts, which had been tak en, or into any of his adversary's forts out of the angle, he loses two points. 35. When a ball i holed or forced over the table, or on, &c. such bal is to be placed on its proper spot; but if it happen that the spot should be occupied by another bal then the ball is to be placed behind, so as not t touch the other ball. 36. Whoever takes a for after it has been regularly taken, and the colours a down, loses two points. 37. When the adversary' ball is out of sight (that is, lying behind a fort so th it cannot be seen,) and the striker wishes to stri the cushion first, and hit the said ball backwards, b giving warning, saying, *I do not see*, if he should hi the said ball, he wins two points; but if he should no hit the ball, he loses two points. 38. If, by this strok

Characters.	Names of Intervals.	Reciprocals of the Binary Logarithms.
c	Major *Comma*	0.017920
đ	*Diaschisma*, and least sum of 4th and Vth Temperaments . . .	0.019545
D	*Diaze* minime	0.023054
π	*Hyperoche*	0.024679
Ɛ	Enharmonic *Diesis*	0.034215
ƒ	*Semitone* subminimis	0.040974
ʒ	Chromatic *Diesis* , ...	0.042599
∫	*Semitone* minimum	0.052135
𝒮	*Semitone* minor	0.058891
L	*Limma*	0.075189
𝔖	*Semitone* medius	0.076814
S	*Semitone* major	0.093109
P	*Apotome*	0.094734
S	*Semitone* maxime	0,111029
4Ɛ	Sum of IIId and 6th Temperaments	0.136861
t	*Tone* minor	0.152004
3∫	Sum of 3d and VIth Temperaments	0.156406
Ŧ	*Tone* major	0.169924
T	*Tone* maximum	0.187844
3rd	Minor *Third*	0.263034
III.	Major *Third*	0.321928
4th	Minor *Fourth*	0.415038
V.	*Fifth*	0.584962
6th	Minor *Sixth*	0.678072
VI.	Major *Sixth*	0.736966
VIII.	*Octave*	1.000000

By help of the above, and the tables of equations among the musical intervals, given under the several articles Apotome, Comma, &c. the binary logarithms of any other interval of the diatonic scale may be found. (e)

BINCHE, a town of France, in the new department of Temmapes, situated on the banks of the river Hairre. It was burned in the year 1554 by Henry II. of France, but was soon afterwards rebuilt. Population 3798. (j)

BINGEN, a town of France, in the new department of Mont-Tonerre, situated near the confluence of the Rhine and the Nah, the latter of which is crossed by a fine stone bridge. The corn which supplies the neighbouring country passes through this town, which also furnishes it with drugs, and articles of foreign commerce. Near Bingen is the famous Bingen loch, or gulf of Bingen, formed by the conflux of the Nah and the Rhine, by a chain of narrow rocks, where the water precipitates itself in cataracts. The navigation of this part of the Rhine is very dangerous. Not far from Bingen is a small island in the Rhine, called *Maustburn*, or the Tower of Rats, in consequence of a tradition, that the Archbishop of Mentz was devoured by these animals, for having compared the poor to rats that preyed upon the substance of the rich. The fortifications of Bingen were destroyed in 1689 by Louis XIV., but it was again fortified by the desire of Bonaparte, when he was first consul. Population 2663. E. Long. 7° 39′, N. Lat. 49° 54′. (π)

BINOCULAR Telescope, the name of an instrument invented by Father Rheita, in which the object was observed by both eyes. Binocular telescopes have been long completely exploded. (w)

Binocular | Biography.

BINOCULUS, a genus of crustaceous animals that inhabit fresh water. See Crustacea. (f)

BINOMIAL Theorem. See Algebra *Index*.

BIOGRAPHY, (from *βιος*, *life*, and *γραφω*, *to write*,) is a species of history which describes the lives of persons of eminence. In tracing the history of biography, we find it at first, in all countries, in the hands of the minstrels. The exploits of the chiefs were the subject of their song; and, as their heroes were raised into demigods, actions were ascribed to them surpassing human ability. This was the fabulous age of biography, when nothing was too marvellous for credulity. In Iceland and in Arabia the harper was the first historian; and both in ancient and modern Europe, the period of youthful romance preceded the sober day of truth. Legitimate biography was scarcely known in Greece till that country had passed the age of manhood; for what was done by Xenophon, in the institution of Cyrus, when Athens was in its glory, is of too equivocal authority to be classed under that head. It was not till the commencement of the 2d century, that Plutarch gave to biography the place which it now occupies among the departments of literature; and to him we are indebted for a more intimate acquaintance with the principal characters of antiquity, than we have with many persons of the first distinction in modern times. Writers of greater elegance, and of more philosophical views, may have followed in his track, but none have succeeded better in accomplishing the great ends of this species of writing, in combining entertainment and instruction, in stamping upon his productions the indubitable character of truth, in presenting a near and familiar view of the subjects of his records, and in filling up the sketches which the historian is obliged, by the nature and extent of his design, to leave to the biographer. During the long night of ignorance which preceded the revival of learning in Europe, biography, degraded from the rank it once held, was enlisted in the service of superstition. The only men of letters in those times were the ecclesiastics, who were disqualified, both by credulity and artifice, for the office of the historian. In their hands biography exhibited a strange mixture of truth and falsehood, gravity and puerility, simplicity and fraud. Fabulous without being romantic, wanting both the authority of truth and the grace of fiction, their tales of wonder could neither instruct the judgment, nor delight the imagination. The subjects of their pen were supplied by the calendar of saints, some of whom were adorned with great virtues, and displayed a heroism in the defence of their opinions which entitle them to the veneration of posterity; whilst others had no better title than is conferred by successful hypocrisy spreading the cloak of sanctity over pride, avarice, and ambition. The narrative of their lives, instead of developing the nature of man, and marking the progress of passion or of intellect, was for the most part a record of nothing but miracles pretended to have been performed by themselves, or entailed upon their ashes. Since the restoration of letters, biography

History.

events which it describes: it shews the soldier in the field, the statesman in the senate, and sometimes in the cabinet; but it does not lead us within the threshold of his retirement, and exhibit him in the interesting relations of domestic life: it gives us the public, but not the private man; or no more of the private man than is necessary to the elucidation of public transactions. When his principles, passions, and conduct, have borne with powerful influence upon the great stream of human action, they are brought into nearer view, and subjected to closer inspection. Still he is seen but at a distance in the great historic gallery; the finer shades of manners, from which actions and characters of the same class derive difference and individuality, are seldom distinguished in this general survey. Here biography steps in with peculiar advantage; it leads us into the familiar walks of life; it shews the monarch in his family, the hero in the circle of his friends, the orator no longer declaiming in the senate or the hall, but conversing on the level of his associates, and unbending his eloquence to negligence and playfulness; it enables us to see the great man divested of his state, the conqueror descended from his car, the mock-patriot in his sphere of private oppression, and the true one supported under public injustice and ingratitude by the lofty consciousness of rectitude.

Its objects.

Biography being one of the numerous departments of history, it has some objects common to them all. It proposes to ascertain and record what is true in fact, and to this end it separates the fabulous from the authentic, discharges the false colouring of prejudice and party, weighs opposing testimonies, exposes the representations of falsehood, and labours, like the Cretan judge, to administer impartial justice to the dead. To accomplish this task, it is necessary that the biographer be capable of patient investigation, and diligent research. Not only must his love of truth raise him above the cloudy region of prejudice and faction; he must be endowed with no ordinary share of sagacity, that he may detect specious fabrications, and through the distortions of envy, and the exaggerations of flattery, discover what is probable and credible. Another, and a principal object of biography, is to record what is instructive in example. It has been remarked, and perhaps truly, that there is no man, however confined his capacity and sphere of action, a faithful narrative of whose life would not furnish lessons of useful instruction; if it disclosed nothing new in human nature, it might at least serve to illustrate and confirm what was already known. But since equal benefit is not to be derived from every life, biography takes out of the long roll of those who have performed the same journey before us, the names of those, whose wisdom or whose weakness, whose virtues or whose errors, are likely to make the deepest and most salutary impression; it thus gives us an opportunity of enriching our own minds with the treasures of experience, which have been collected by others, and collected often at a great price of labour and of pain. A question has been made by the critic and moralist, respecting the epic poem, whether it is necessary that the hero of the piece be distinguished for virtue, as well as for the splendour of his qualities and exploits; and, though the poet has not always chosen or constructed his story in conformity to such a rule, it must be owned, that had he done so, he would have rendered an important service to the interests of virtue, instead of leaving it, to say no more, very questionable, whether his productions have not, in some instances, militated against them. Unless the hero be encircled with a radiance sufficient to dazzle even a strong sight, his poem will soon be found to be any thing but poetry; and if a character intrinsically bad be made powerfully to engage admiration, the principles of virtue must be much better understood, and more generally, and at a much earlier age settled in the mind than they are in fact, to prevent admiration becoming sometimes the forerunner of imitation. The same objection does not lie, however, against making a man of depraved manners the subject of biographical memoir; for in such cases it is the fault of the biographer, and not an inevitable result of this species of writing, if the admiration of splendid talents is made to prevail over the detestation of depravity. Biography proposes to rescue what is memorable from the spoils of time. In every age, men of more than ordinary endowment, have risen above the plain of their cotemporaries, who, by their actions or writings, have not only commanded an extensive influence over the times in which they lived, and the people with whom they mingled; but even over succeeding ages, and over nations far removed from the immediate sphere of their activity. Destroyers, or benefactors of mankind, they were the volcano whose eruption carries desolation in its course, or the heights that send their streams to fructify the land, and give plenty to the inhabitants. We contemplate the records of their lives as monuments of generations which have been long extinct; and travelling up the stream of time, we gain a sense of pre-existence to the short life which is allotted us among our cotemporaries. We converse with the greatest and wisest of our progenitors, and are sometimes privileged to enjoy a sort of confidential acquaintance with them, to visit their solitude, and penetrate the recesses of their minds, the principles and motives of their conduct. It is also consolatory to know, that though the common law of our nature extends its rigorous necessity to the wisest and the best, as well as to the least and worst of mortals, yet every memorial of them shall not perish with their lives; their memory, if not their existence on earth, shall be perpetuated, and shall kindle a kindred flame in the breast of their successors, when they and their ashes have long lost "their wonted fires." One end of biography is to add to the stock of human knowledge, and of that part especially which it most concerns all men to possess,—the knowledge of human nature. In the study of man, as well as of every other species of being, if we would not substitute fiction for reality, we must begin with particulars, and proceed to what is general. The individual must be known before it can be ranged under its proper class. Nothing so much retarded the progress of knowledge as the pursuit of a contrary method through a long succession of centuries. The philosopher was degraded into the mere schoolman, and was employed in forcing and torturing nature

been accustomed to venerate; and though the man was born "not for an age," or a sect, but for all mankind, his name is forced into the service of particular bodies of men, and made to stand as a sort of authoritative signature to certain sets of opinion. The violence which is done in such instances to historical truth, is not the whole of the evil; the purpose for which evidence is suborned, and testimony perverted, is condemned by every friend of truth. Few causes have thrown such impediments in the way of enquiry, and given such stability to error, as the imposition of names. When authority is opposed to argument, reason must be silent; from that moment it is put out of court: the cause is referred to arbitrary decision; it is to be determined not by an appeal to the common understanding of mankind, but to the judgment of one whose powers of discrimination might not exceed, and whose means of information probably fell below those which are possessed by some of his successors. But the most perverted use is made of this kind of history, when it is employed in the service of malice and detraction. Not only is living excellence exposed to the persecution of envy; its malignity has dared to penetrate the sanctuary of the tomb. Long after the curtain has been dropt, the hiss of jealousy or malevolence has been prolonged, and though it may have been drowned at first by general applause, it has found its time to be heard, and that too often with effect. The honest and able biographer holds the balance of departed merit, and feels his office to be one of high responsibility; but when the libeller of the dead places himself on the bench, envy usurps the seat of justice, merit is robbed of its reward, the chambers of the dead are violated, and sacrilege is added to injustice. This abuse of biography is the more dangerous, because the detractor will never want an audience as long as envy and ill-nature are found among mankind; the little-minded will always crowd around him, and it is well if mediocrity does not lend a patient ear to representations, which seem to give it elevation by lowering the standard of comparison. The faults which have been mentioned have little claim upon indulgence; but there are errors incident to biography which are entitled to greater lenity. It is natural that the writer should contract something like a friendship for the subject of his memoirs; and it is no wonder, if, under its influence, he is sometimes tempted to produce too flattering a picture. Not contented to set down nought in malice, he may be bribed by his feelings to suppress what ought to be set down in justice, to throw a veil over failings, and place merit in a light too strong for truth. This is a weakness which it requires as much apathy as strength of mind to regard with extreme severity, especially if the historian was the associate and friend of the subject of his history: the partiality is amiable, and though our judgment must condemn it, the heart of every good man will plead in palliation of the offence. Still it is a weakness and an error, and one which is not innocent in its effect, whatever it may be in its source: by shaking the authority of the whole relation, it frustrates the design of it, if that design was, as it ought to be, moral improvement. It may also be directly prejudicial to the mind in which right principles of action
are not fully established; for it is too much to e
pect, that the relaxation of rigour which has be
admitted in judging the actions of others, should ha
no influence in the judgment we pass upon our ow
the apologist of other men is not likely to be a ve
severe critic upon himself; it is enough that he
not more lenient to his own failings than to their
he cannot in reason be required to pronounce a mo
rigorous sentence when his own cause is determin

If the historian has his partialities and prejudic
all other men have also theirs. Nations are not f
from them any more than individuals, and there
some to which duration, and general suffrage, h
given a sort of prescriptive right to govern. It
the duty of the biographer to be upon his gu
against the influence of public prejudice scarcely
than his own. Though it may be presumed, t
the judgment which has been passed upon characte
by successive generations, or by a great majority
any single generation, has reason on its side, this m
not be laid down as a universal and infallible ru
There is a fashion both in praise and censure, whi
one age transmits to the next, till it has acquired t
sanction of antiquity: it is not easy to account othe
wise for the manner in which some names are recor
ed in history, one being the signal for extravaga
panegyric, and another for unqualified censure, thou
nothing is produced in evidence respecting eith
which can justify such warmth of applause or co
demnation. The memory, as well as the lives of me
is often attended with a good or ill fortune, th
seems to preside over the reputation after death as
did over the condition in life, with little regard to t
true measure of merit or demerit in either. In th
instances, the biographer must dare to oppose
stream of opinion; a duty that requires both fo
tude and address, whether the opinion respect pe
or principles: and as every error has its own a
gonist, he who undertakes this labour, is also hi
in danger of being enticed by the love of singul
and of that notice which is attracted by it, to
new views of characters and actions, widely dif
from those which are commonly received, but
ing without sufficient evidence and reason. O
affectation, a late eminent writer, Lord Orfo
been accused; and notwithstanding the ingenui
which he has added probability to novelty i
of his biographical views, the charge will sca
thought to be altogether unfounded.

In taking a survey of the difficulties that
on biography in particular, the first which
itself, arises from the nature of the authori
which a principal part of the biography m
rest. National history can refer to national
and public documents are the vouchers
events; but the principal facts in biogra
their nature, will be frequently support
private testimony and traditional report.
authorities which are not always accessibl
they are so, they are not always the mos
or secure. Yet they may be the best, an
only witnesses that can be called in, upo
whose representations new facts are to
false statements to be corrected, some
neral belief to be controverted, and ot

Comparison of the different kinds of biography.

this number is the author of the *Idler*, who considers the advantage of a perfect knowledge of the facts to be recorded, as more than a balance to the disadvantages inseparable from such an undertaking. In these memoirs, the author cannot deviate from truth through ignorance, or involuntary error. His memory is competent to the taste, and his conscience demands that it be faithfully executed, if it be executed at all; and though it is inevitable that his narrative should have the colouring of self-love, every man is sufficiently acquainted with the strength of that principle in his own breast, to make due allowance for its operation. The reader is therefore upon his guard against its delusive representations, and less liable to imposition than when the narrator pretends to the impartiality of an indifferent observer, or when the bias, if he can be suspected of any, is only such as is impressed by friendship, whose partiality may be judged indifference, when compared with the influence of self-love. There is, however, one kind of biography, which appears to unite in a good degree the advantage which each of the other possesses separately; in which the narrative of the historian is supported, and elucidated by the epistolary correspondence of the subject of his history. Recent examples of this sort are before the public in the lives of the contemporary poets Burns and Cowper.

It would seem needless to remark, that this kind of biography should be appropriated to names of the first eminence on account of its voluminous form, had not instances occurred in which it is employed on subjects of inferior consideration. But whatever may be the gratification and advantage of possessing such biographies, all who know how to estimate entire confidence between man and man, will enter their protest against an unlicensed, unwarranted, and unfeeling disclosure of what was penned only for private inspection, and in full confidence that it would never be exposed to the public eye. (J. M.)

BIRCH, Thomas, was born in London in the year 1705. His parents were Quakers; and his father, who was a maker of coffee-mills, intending to instruct him in his own profession, consented with reluctance to indulge his predilection for literary pursuits. He received the elements of grammatical education at Hemel Hempsted, in Hertfordshire, where he afterwards officiated as usher. He sustained the same office in several other public seminaries, and was always remarkably attentive to promote his own improvement by the opportunities of information which they afforded. He never enjoyed the benefit of an university education; but took orders in the church of England, about the year 1728; and married, soon after, the daughter of a Mr Cox, to whom he was acting in the capacity of a curate. His wife died about twelve months after marriage; and Mr Birch, upon that occasion, wrote a copy of verses of considerable merit, which appeared in the Gentleman's Magazine, and are inserted, with much approbation, in Mrs Rowe's miscellaneous works. Having been recommended to Lord Chancellor Hardwicke, he was presented by him to the living of Ulting in Essex, A. D. 1732; and in 1731, was appointed domestic chaplain to the unfortunate Earl of Kilmarnock. In 1735, he was chosen a member of the Royal Society, under the patronage of Sir Hans Sloane; and was soon afterwards admitted also into the society of antiquaries. He passed through a variety of preferments; and the last which he attained, was the rectory of Debden in Essex, A. D. 1761. He received the degree of doctor of divinity from the Mareschal college of Aberdeen; was elected one of the secretaries of the Royal society; became also a trustee of the British museum; and was held in great respect by a number of literary friends; when he was suddenly killed by a fall from his horse, A. D. 1766, in the 61st year of his age. Dr Birch had been very liberal to his relations during his life; but as none of his near kindred survived him, he bequeathed his books and manuscripts to the British museum; and left the remainder of his fortune, about £500, for the purpose of increasing the salaries of the assistant librarians. His literary productions were exceedingly numerous; but chiefly confined to history and biography. He wrote the greater part of the General Dictionary, historical and critical, 10 vols. folio; a variety of lives and memoirs; several historical disquisitions; a number of communications to the Royal society; a history of its progress and transactions; and left behind him an incredible collection of manuscript extracts and transcripts. Though not ignorant of classical learning, Dr Birch was distinguished chiefly by the variety of his knowledge. He excelled in modern history, particularly in that of his own country; and though by far too minute in his details, is admitted to have been a most judicious compiler. By his habits of early rising and regular application, he was able to accomplish his numerous literary undertakings; and, at the same time, to enjoy a great degree of general intercourse in society. He was of a chearful and social temper; of simple and unaffected manners; of a very obliging and benevolent disposition; and a friend to civil and religious liberty. See *Biog. Britannica*, and *Biog. Dictionary*. (*q*)

BIRDS, Migratory. Throughout the whole range of natural history, there is not a more wonderful, nor perhaps a more interesting phenomenon, than that of the migration of birds. We have our summer and our winter birds of passage; but to what countries, some of them, after leaving us, take their flight, has not been yet accurately ascertained. We well know, however, that when the weather is favourable, they are most regular, both in their arrival, and in their departure. The long aerial journies which they undoubtedly make, while they excite our wonder, must convince us, that this *instinct*, or whatever it may be called, can be nothing, but a divine energy, impelling and conducting them, through the trackless regions which they have to explore. The much boasted reason of man is often frail and fallible, but the instinct of brutes seldom forsakes them, and when followed never leads them into error. Strange too, that this sagacity of migration, although in the face of many difficulties and dangers, should always be performed with the utmost alacrity and pleasure. For their subsistence and propagation, Providence has certainly given them this inclination, Birds, Migratory.

do urbica,) the sand martin (*hirundo riparia*,) and the swift or black martin (*hirundo apus*,) which does not appear till May. In this order they arrive, one after another, the chimney swallow preceding the others by several days. This is the bird that has given rise to so much controversy concerning its winter retreat; some naturalists, however, take in the whole tribe, indefinitely, in this dispute. Olaus Magnus, Etmuller, Biberg, Forster, Barrington, and even Linnæus, seem to favour the opinion of the submersion, and after resuscitation of the swallow.[*] We shall quote a few of the most striking, from the many authorities given in support of this wild and supposed process in natural history.

"Mr Peter Brown, a Norwegian, and ingenious painter, informs me, that, from the age of six to seventeen, whilst he was at school near Sheen, N. lat. 59°, he with his companions hath constantly found swallows in numbers *torpid* under the ice, which covered bogs, and that they have often revived, upon being brought into a warm room."

"Mr Stephens, A. S. S. informs me, that when he was fourteen years of age, a pond of his father's (who was vicar of Shrivenham in Berkshire) was cleaned during the month of February; that he picked up himself a cluster of three or four swallows (or martins,) which were caked together in the mud; that the birds were carried into the kitchen, on which they soon flew about the room in the presence of his father, mother, and others, particularly the reverend Dr Pye."[†]

"Dr Wallerius, the celebrated Swedish chemist, wrote in 1748, Sept. the 6th. O. S. to the late Mr Klein, secretary to the city of Dantzick, "That he has seen more than once swallows assembling on a reed, till they were all immersed, and went to the bottom, this being preceded by a dirge of a quarter of an hour's length.[‡] He attests likewise, that he had seen a swallow, caught during winter, out of a lake, with a net, drawn as is common in northern countries, under the ice; this bird was brought into a warm room, revived, fluttered about, and soon after died."

"I can reckon myself (Forster) among the eye witnesses of this paradoxon of natural history. In the year 1735, being a little boy, I saw several swallows, brought in winter, by fishermen from the river Vistula, to my father's house, where two of them were brought into a warm room, revived, and flew about. I saw them several times settling on the warm stove (which the northern nations have in their rooms,) and I recollect well, that the same forenoon they died, and I had them when dead in my hand."[||]

In the same style, innumerable affidavits from North America, and other parts of the world, have found their way, into our newspapers, journals, and magazines. The Statistical Account of Scotland furnishes us with a specimen, somewhat more circumstantial, but of the same kind with the foregoing, and from being nearer home we shall with it close our proofs for this submerging system.[§] "We have no uncommon migratory birds; and it is doubtful whether all birds, usually reckoned of this class, do really belong to it. The ground of this doubt well appears, from the following observations respecting the swallow. Owing to a hint given to me by a neighbour, I have been for some seasons pretty attentive to the first appearance of this bird, but not accurate enough to mark the dates, till last spring, when on the 2d of May 1793, I saw them for the first time, pretty early in the morning, in considerable numbers on the loch (about eighteen yards from the bottom of the garden,) from which they seemed to be just then in the process of emerging, though, as there was some rippling in the water, it was difficult to discern the breaking of the surface, but the observer is positive, they just then arose from the lake, and therefore must have lodged or lain somehow at the bottom, since the time of their disappearing last year. The weather all day continued as it began in the morning, moderate with an easy breeze from S. W. and the swallows sometimes in bodies, sometimes in detachments, enjoyed themselves, in skimming along the surface, or soaring aloft in the air, or fluttering about the shores, but went very little way off the water till evening, when they collected over the lake, and disappeared within observation. With anxious expectation, they were looked for next morning, and all day through, but no appearance of them, nor for several days following; and therefore there can be no doubt of their descending into their lodgings at the bottom; having from that day's experiment, felt or judged the air not sufficiently encouraging for them to live in. Nor were they seen till the 11th of May, when they were again observed in the process of emerging from the lake, and continued playing their gambols, and fluttering about the shores of it, until evening, when they disappeared as formerly, and were seen no more till [illegible] evening of the 21st of May, when the manner of their disappearing was exactly the same as before mentioned. The last experiment succeeded; they felt, it should seem, the temperature of the air [illegible]couraging, and in a few days began to prepare their summer dwellings."

It is an unpleasant task to express our doubts, respecting the accuracy and truth of these seemingly well attested statements; our readers, however, can give such degree of credit to them as they think they may upon the whole deserve. For our part, we can hold them in no other light than we do the certificates obtained and annexed to the advertising bills of quacks and mountebanks, enumerating the various cases of persons restored to health, by their never-failing medicines. We at the same time admit, that natural history ought not to be studied from ures and opinions, but from a history and col- of well known facts. But here where the of probability, nay of the laws of nature, are down, to give way for a wild hypothesis, and less system, we must pause, and have at ourse to unbelief. But we shall now proceed our reasons, for doubting the correctness of the ng narratives. The specific levity of a swal- st prevent it from being able to descend to tom of a rapid river. No bird could continue months under water, without suffocation or ion. That celebrated anatomist and natur- e late John Hunter, tells us, "That he had d many swallows, but found nothing in them t from other birds, as to the organs of respi- ' and consequently draws this conclusion, they could not remain for any time under without being drowned." It is an incontes- ct, that swallows do not moult in this country, hey hibernate under water, it is simply im- e that they can undergo that operation, or at quire new feathers there. We may therefore here do they moult? The ingenious and in- e Reaumur says, that he was often promised, everal of his correspondents, ocular demonstra- f bundles of swallows to be found under the that might at any time be discovered torpid buildings, &c. but that none of these gentle- er kept their words with him. We have also rit to confirm us in the belief of the migration swallow, "yea the stork in the heaven know- appointed times, and the turtle, and the crane, e *swallow*, observe the time of their coming." iah chap. viii. v. 7.) From all these consider- we infer, that the whole of the swallow genus ds of passage, and that they do not remain with us during the winter either above or water, or in any state whatever. That some s and bores may be found dead, or others d, we shall not dispute; nor shall we pretend ely to determine, to what countries they go aving us. We are, however, rather inclined to , with Willoughby and Buffon, that they in Africa; an opinion which is much strength- the following observations of Adanson when gal: "(February) The hut where I lodged ge and commodious, but as dark as a subter- cavern, even at noon day, because it had no pening but a door pierced at each end. Here observe, that a great number of our *European* s resorted hither every evening, and passed ght upon the rafters; for as I have elsewhere ed, they do not build nests in this country, *but ome to spend the winter*." Voyage to Sene-

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[*] *Hirundo (rustica) habitat in Europa domibus intra tectum, unaque cum urbica demergitur, vereque emergit.* Syst. Nat.

[†] Barrington's *Miscell.* p. 229.

[‡] We suppose this must have been what that most marvellous natural historian Pontoppidan calls *the swallows' song*, which *every one knows they chant before sinking under water.* Nat. Hist. of Norway.

[||] Forster's notes to Kalm's *Travels*, vol. ii. p. 6—8.

[§] Account of the Parish of Rescobie, Forfarshire, by the Rev. Thomas Wright. Vol.

writer of this article has also to mention circumstance, which entirely convinced him e whole of the swallow genus, previous to the in of winter, migrate from cold to warm ies.

Birds, Migratory.

the 11th day of October 1791, when on board the ship Pigou from London, bound for Philadelphia, between the capes of May and Henlopen, he observed immense flocks of swallows,* flying towards the south. Next day when he came within the Delaware, myriads also appeared, all stretching and steering their course in the same direction, which was down the river. Pennant, a naturalist whom we must always mention with veneration, although he sneers at the idea of the submersion of the swallow, yet yields, in some degree, to the opinion, that the latter hatches, or broods remain in this country and become torpid during winter; but he has brought forward no satisfactory evidence to establish this point. The swift disappears about the middle of August, the chimney and house swallows from the 10th to the 15th of October, and the sand martin soon after them.

The cuckoo.

The bird, that in spring (April) immediately follows the chimney swallow and house martin, is the *cuckoo*, (cuculus canorus,) the only species of the genus cuculus that we have in Britain. His monotonous and short call, although somewhat unmusical, gives always delight, as it is the never-failing indication of approaching summer. The cuckoo often calls when flying, is restless, and seldom sits, or continues its notes long on one tree. The prevailing opinion is, that it neither hatches nor rears its own young. But as we are, in general, unbelievers in most of the supposed anomalies of nature, we shall offer our doubts respecting the truth of this assertion. The opinion respecting this unnatural act of indifference of the cuckoo towards its own offspring, may be traced so far back as the days of Aristotle, who has written on the subject, and who was afterwards followed by Pliny. These naturalists differ a little in their accounts; the first averring, that the cuckoo destroys all the eggs in the hedge sparrows nest, and then deposits her own single one; while the last author says, that the hedge sparrow, notwithstanding the disparity of size, hatches the additional egg, with the whole of her own, which remain untouched. The general study of natural history, has enabled us to judge of the degree of credit, that should be given to the many idle stories, which formerly disgraced her volumes; such as the ostrich laying her eggs in the hot sands of Africa, and the sun hatching them without any regard on the part of the parent. Of the fretful porcupine shooting his quills against those who assailed or annoyed him, and with many others of the same kind. But late travellers have convinced us of the falsity of these and such reports. We are also apt to think, that this popular story respecting the cuckoo, will soon, like these, pass away as a mere vulgar error. We never yet, after much pains and search, could find a cuckoo's egg, either in the nests of wood pigeons, hedge sparrows, larks, wagtails, or yellow hammers. To make all these birds stand as the foster dams to the cuckoo, is surely a most glaring absurdity. Some of them are not insectiverous, which all cuckoos are; and we can hardly imagine, that they would change

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* *Hirundo cauda aculeata Americana.* Catesby.

Birds; Migratory.

their food and habits of life, and become, contrary to nature, the affectionate guardians of such unaccountable orphans. Wood pigeons and yellow hammers feed upon grains and seeds; cuckoos upon caterpillars, meal worms, maggots, dragon flies, &c. Birds, too, *that are not domesticated*, would hardly submit to have their own eggs thrown out, and to have such a huge one placed in their stead, without forsaking their nest. Mr John Hunter, whom we have formerly mentioned, dissected many cuckoos, and found them as well fitted and formed for incubation as any of the birds that are said to hatch them. Indeed, we have frequently made inquiries about this popular belief, of the cuckoo not hatching her own eggs, nor of rearing her own young, but we never were able to get any well authenticated accounts of such an unnatural abandonment of parental care. We therefore are rather inclined to be of opinion, that, upon a close investigation, the cuckoo will be found to build its own nest, to lay more eggs than one, and to bring them into life from its own incubation. Many more fabulous stories are told about this silly bird, of its being discovered in stacks of wheat, with its feathers pulled off, and of its lying hid in hollow trees, &c.; but all such tales are void of truth, for the cuckoo undoubtedly migrates early in the season, in order to pass the winter in some more temperate climate than that of Britain.

The rail.

The rail, corn crake, or daker hen, (*rallus crex*) arrives in Scotland about the middle of May, and his note is heard, whenever the meadow, sown grass, or corn fields, are so long as to cover or conceal him when running. Its call is pleasant, from the circumstance of its ushering in our summer. We name them *crakes*, from the sound which they emit resembling crake, crake, crake. They run along the ground with surprising swiftness, and their cry may be heard in every corner of an inclosure, of 20 or 30 acres, in a very few minutes. Although they are unquestionably birds of passage, they are seldom seen either going from, or returning to this country. There are great numbers of them in Scotland, Ireland, Anglesea, and some other parts of Wales; but they are rather scarce throughout England, except in the northern counties. They generally lay from eight to twelve eggs, and the young crakes run as soon as they burst the shell; but the mower's scythe is frequently fatal to them, by sweeping away the nest before this period arrives. The partridge fowler falls in with them among the turnips and the late standing corns, in which they take shelter when the other fields become bare. They frequently foil the pointers, by making sudden stops and squats, by which means they often overshoot them; but a known dog is commonly aware of this trick; however, they have always much difficulty in springing them, and are obliged sometimes to run hard to force them on the wing; they fly slowly, and are easily brought down, even by an inexpert fowler. They leave us whenever the fields are clear of the growing corns.

The quail.

It has been said, that wherever rails are plentiful, there also quails abound, (*tetrao colturnix*). This is an assertion which we know to be ill founded; as the quail is a scarce bird with us, although crakes are numerous. Indeed, they seem to delight more in haunting warm than cold climates, for in Italy, and other parts of the south, a hundred may be found for one that we have in our northern kingdoms. We have seen a few bevies in the county of Haddington, and two or three single birds in Fife, but in no other places of Scotland. Daniel, in his *Rural Sports*, tells us, "that the quail seems to spread entirely throughout *the old world*, but does not inhabit the *new*." From what source he derives this information we cannot say, but he is certainly much mistaken, as we have shot many hundreds in America, and have seen thousands in a day brought both to the markets of Philadelphia and New York. They are, it is true, on account of their great size in comparison with the European quail,[*] (weighing about eight ounces,) called by some Dutchmen and old English inhabitants partridges, but they have all the distinguishing marks of *the real colturnix*, and also the peculiar note of whit, whit, whit, which quails often repeat when running, flying, or calling to their young. If pressed by dogs, they frequently perch upon trees, which partridges seldom or never do. They are the only species of the *tetrao genus* that migrate, and this characterises them in America, as well as in every other part of the world. As grouse and partridges are the principal birds of sport with our British fowlers, so are quails with those of America. In the state of New York, one person, with a dog and a gun, will often kill six or seven brace before noon. In America, they frequent the wheat and maize stubbles during the day, and retire generally to the woodlands to pass the night. Instead of the quail-pipe and net, the farmers there generally use traps or gins; these they place in the tracks which the birds make in their way from the woods to the corn fields. It is upon the first appearance of dawn that they traverse this ground; and they are then taken in great numbers, and are brought to market by the country people along with the rest of their poultry. The time of the arrival of the few which we have [illegible] Scotland has not been well ascertained, but they depart early in October.

The goat-sucker, (*caprimulgus Europæus*,) called in several places of England the goat-milker, fern-owl and churn owl, appears in Scotland about the first [illegible] June. It derives its name from the once received belief of its sucking the teats of the goat. This opinion was, so far as we know, first patronised by Aristotle, although perhaps held as a truth long before his time. But the idea is now, by every rational naturalist, completely exploded. When twilight sets in, the goat-sucker is commonly discovered sitting upon the stump or bough of a leafless-tree, or fluttering amidst the dust of some beaten road. It emits a singular vibrating sound, something (as has been observed) like the noise of a large woollen spinning wheel; and when pursuing or addressing its mate, gives a shrill quick cry, which is supposed to be the language of love. Kalm and Linnæus seem bers that are sent, during the winter season by stage coaches, from the provincial towns of England to the all-devouring capital, are truly astonishing. The American woodcock is in all respects the same as the European, only of less size. They return from Britain to their native haunts in February and the beginning of March.

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[*] This is a rare instance, in opposition to the hypothesis of Buffon, "That animals common both to the old and new world, are smaller in the latter."

The snow-bunting.

The snow bunting, better known in Scotland by the name of snow flake, or flight, (*emberiza nivalis*). It is late in the season before these birds shew themselves here; they are commonly the heralds of hard and snowy weather, and sometimes, if fatigued, fall on vessels while on their passage across the Pentland Firth. We apprehend they do not quit Lapland, Norway, or the northern parts of America, until, by the heavy storms of these rigid climates, they are forced to seek a comparatively milder temperature. It is said, that a few breed in the mountains of Scotland, but we never saw, nor indeed heard of, any person who discovered during summer a nest, or even a straggling bird of that species. They are not often observed in England, as their excursions to the south generally terminate in the Cheviot hills. They assemble in great flocks, are sudden in their arrival, and equally so in their departure.

Bohemian or waxen chatterer.

The Bohemian or waxen chatterer, or the silk tail, (*ampolis garrulus*) is a singularly beautiful bird. It is bigger than a sky lark, the length, from the tip of the tail, being nine, and the breadth, when the wings are extended, twelve inches. The bill is of a deep black; on its head there is a crest. The breast is chesnut, the belly ash, the back bay, the rump of a dun colour. The outward wing feathers black and spotted. Upon the tips of the seven small quills are horny appendages, of a fine vermilion, somewhat resembling sealing wax. They are gregarious, and visit us but with a short stay, and that only in two or three years, and not annually, as alleged by Pennant and the late Dr Ramsay. We have at different times seen small flocks of them about Collington, a village to the west of Edinburgh, where several have been shot, and afterwards preserved. They come always in February, remain a few days, and then return to their native country, Bohemia.

The hoopoe.

The hoopoe (*upupa epops*). Not breeding in Scotland, we shall set it down as a winter bird of passage. They come from Italy and Germany, are desultory in their motions, and observe no stated times in their appearance, indeed few are to be met with in this country at any season. We have seen only two here, one which the late Mr Weir found near Edinburgh, and had afterwards preserved in his museum, and another which was sent us from the east nook of Fife, by a gentleman who had shot it there. The hoopoe is near the size of the lapwing, but does not weigh one half so much. The head is adorned with a fine crest, of two inches high, reaching from the bill to the nape of the neck; both the plumage and the figure are truly elegant, and many take it to be one of the most beautiful birds in Europe. Its appearance used formerly to be reckoned by the vulgar as a presage, of some direful calamity. A few of the anas and mergus genera, who breed during summer in the retired lakes and swamps of Lapland, Norway and Finland, arrive here early in the winter.

Before leaving this article, we have to regret, that such a *desideratum* as a thorough knowledge of the migration of birds should have been so little studied, and so long neglected. Indeed, until it is more sought for in the fields than in the closet, any farther insight into this divine impulse cannot well be expected. What excellent opportunities have our clergymen, sportsmen, and travellers, to inform themselves and the world of the curious particulars which attend this wonderful subject! They might easily, by taking observations, which are so often within their reach, soon remove the various doubts and uncertainties that still hang upon this most interesting branch of our natural history. (A. D.)

BIRD CATCHING, denotes the art of taking birds or wild fowl; and is performed in various ways, according to the season of the year, or the species of bird intended to be caught.

If the flame of sulphur be held under the trees, on which birds are observed to perch during the night, they soon become suffocated, and fall down in a state of insensibility: In this manner pheasants are frequently caught.

If a portion of wheat, or any other grain, be steeped in a mixture of wine lees and hemlock juice, and then scattered in those places where birds are known to resort, they will speedily be inebriated by eating it, and drop down upon the ground, or become unable to escape.

When the ground is covered with snow, choose a spot within 20 or 30 yards of a window, door, or any other shelter, by which you may be concealed from the birds; and clear away the snow from a space about six or seven feet square. In the middle of this space place a wooden table or board; fasten to its sides several pieces of pipe staves, about six inches long and one broad, in such a manner that it may easily turn upon the nails; and under the four ends which are not nailed, put four pieces of tile or slate, that they may not penetrate the ground, so as that the table may fall down upon the slightest jog. Make a small notch in the end of the table, in order to put into it the end staff, which should be seven inches long and one broad, and let the other end rest upon a piece of slate or tile. Arrange the whole in such a manner, that the board would be ready to fall towards the place where you stand, if it were not supported by the end staff; and to the middle of this staff let one end of a small cord be fastened, while the other end is conveyed to your station. To make the board fall more readily, a little earth, or any other material least likely to frighten the birds, may be laid upon it; the whole is then to be covered with straw, and some grain scattered underneath and round about the board. When the birds perceive the ground free from snow and covered with straw, they will readily fly to pick up the corn round the board, and will gradually proceed to that which lies under it; the cord is then to be pulled, and the stick being thus drawn out, the board will fall down and secure the birds underneath.

The smaller kinds of birds are frequently taken with bird-lime, which is one of the most eligible modes in frost or snow, when all sorts of small birds assemble in flocks, and which may be used in various ways. Put the bird-lime into an earthen dish, with the addition of one ounce of fresh lard to every quarter of a pound, and melt the whole gently over the fire. Take a quantity of wheat ears, with a foot of the straw attached to each, and having warmed the lime that it may spread the thinner, lime about six inches of the straw from the bottom of the ears. Scatter a little chaff and threshed ears over a compass of 20 yards; stick the limed straws into the ground with the ears inclining downwards, or even touching the surface; traverse the adjoining places, in order to disturb the birds, and make them fly towards the snare; and by pecking at the ears of corn, they will become so entangled with the limed straws as to be easily taken with the hand. The lime may also be applied to cords, rods, and twigs, especially when it is intended to entangle the larger birds, such as snipes and field fares; and for this purpose the following mode may be adopted. Take the main branch of any bushy tree with long straight and smooth twigs, such as the willow or birch; clear the twigs from every notch and prickle; lime the branches to within four fingers of the bottom, leaving the main bough, from which the others rise, untouched with the composition; and then place the bush, where the birds resort. For small birds, two or three hundred single twigs, about the thickness of a rush, and three inches in length, may be stuck in sheaves of flax and corn. In hot and dry weather the twigs may be placed around the rivulets, ditches, and pools, to which the birds come for drink; covering the waters at the same time with brushwood, so that they can have no access to quench their thirst, except at the spot where the twigs are fixed. For this purpose, the rods or twigs should be about a foot in length, limed to within two inches of the thickest end, which is stuck into the bank in such a manner, as that they may lie within two fingers breadth of the ground; and as the birds do not alight at once upon the place where they are to drink, but gradually descend from the higher trees to the lower, thence to the bushes, and lastly to the bank, it is useful to fix a few branches about a fathom from the water, in a sloping direcion, with a few lime twigs fastened upon them, on which the birds will as frequently be caught as on hose which are placed nearer to the water. The best time for this sport is from ten to eleven in the forenoon, from two to three in the afternoon, and bout an hour before sun-set, when the birds come to he watering places in flocks before they retire to roost. Spallanzani describes, in the 6th volume of is Travels, the following mode of taking swallows by means of bird-lime, (at the time when they are buildg their nests,) with which he amused himself in his ounger years. He took a slip of birch wood about inch in length, covered it with bird-lime, and fasned it across a light feather. He then ascended the roof of the out-houses, around which the swallows were flying; blew the feather to a little distance with is mouth, and as it was carried away by the wind, or fell slowly downwards, it was seized by the birds, and entangling their wings by the bird-lime, made them fall suddenly to the ground. Various means are employed to collect the birds together, and draw them towards the spot where the lime twigs are fixed. They may be attracted by imitating their notes with the mouth, or a bird call; by living bats or owls, which will be followed and gazed at by the other birds, and even by having their skins well stuffed, or their figures carved and painted in wood; by a bird of the same kind with those which are to be caught placed in a cage upon forked sticks, a few inches from the ground, at a fathom's distance from the twigs; or by fastening some of the birds that have been taken to a packthread extended between two sticks, allowing them so much freedom that they can stand easily on the ground, and when the string is pulled can fly up to a small height, in order to attract those which are hovering in the air.

By traps. Birds are taken also by various kinds of traps, which are frequently formed in a very simple manner, of nooses made of hair, and which are placed in different ways for different kinds of birds. The wheat-ears are so extremely timid, that they take shelter under a stone, or creep into holes whenever the sun is obscured by a cloud; and, by digging a number of small holes in the ground, in each of which is placed a noose of hair, they are taken in the open downs in great numbers. Woodcocks and snipes are caught in a similar manner, by placing the nooses along their paths, in marshy and moist grounds. Larks and other small birds may be taken in the same way, when the ground is covered with snow, by stretching along the surface 100 or 200 yards of packthread, pegging it down at the distance of every 20 yards, and fastening, at every six inches, a noose of double horse hair. Some white oats are scattered along the line among the nooses, in order to entice the birds; and when three or four are taken, they must be removed from the noose, lest the others should be debarred from approaching.

By nets. One of the most successful modes of bird-catching is by the net, which is chiefly employed during the night, and which requires several other accompaniments. Take, for instance, two light and straight poles, ten or twelve feet long; tie two corners of the net to the smaller ends of these poles, and fasten the other two corners as far as they can be stretched towards the thicker part, connecting the sides of the net along the poles with a little packthread. Search for a bush or thicket to which the birds are likely to have retired; unfold the net, and pitch it exactly to the height of the bush, between the wind and the birds, as they always roost with their breasts towards the wind. Let a person, with a lantern or lighted torch, stand behind the middle of the net, while another beats the bushes on the opposite side, driving them towards the light, when they will readily fly to the quarter where the torch is held, and fall into the net. This method succeeds best in woods, where holly bushes grow under the trees, and when the weather is cold and dark. In open countries a trammel-net may be used, which is generally about thirty-six yards in length, and six in breadth, the lower end of which is plumbed to make it lie close, while the upper end is kept suspended at the two corners, and

is thus dragged along the ground at about a yard in height. At each end lights must be carried, and persons stationed with long poles to raise up the birds as they proceed, and to take them as they ascend under the nets. Along with the nets and lights, a bell is frequently employed in open countries and stubble fields, from the middle of October to the end of March. At night, when the air is mild, take a low bell of a deep and hollow sound, and of such a size as to be conveniently carried in one hand; and provide a lantern or a square box, lined with tin, and open at one side, into which two or three large lights are to be placed. Fix the box to the breast, carry the bell in the left hand, and with the right hold a hand-net, about two feet broad and three long; or the light may be held in the hand, with the arm extended forward, while the bell is tied to the girdle, and hangs down upon the knees, by the motion of which it is made to sound. A companion may walk on each side, provided with a hand-net three or four feet square, but keeping a little behind, that he may not be within the reflection of the light. The sound of the bell makes the birds lie close, while the light also tends to overpower them; so that the net may easily be spread over them, as they are seen lying on the ground. Birds are also taken with nets during the day, especially in those seasons of the year when they change their situation; in the month of October, for instance, when the wild birds begin to fly, and in March when the smaller kinds assemble for pairing. They are chiefly on the wing from day-break to noon, and always fly against the wind. The bird-catchers, therefore, lay their nets towards that point to which the wind blows. The nets employed in this way are generally twelve yards and a half long, and two and a half wide; and are spread on the ground parallel to each other in such a manner as to meet when turned over. They are provided with lines fastened in such a way, that, by a sudden pull, the bird-catcher is able to draw them over the birds, that may have alighted in the space between those parallel sides. In order to entice the wild birds to alight among the nets, *call-birds* are employed, of which there must be one or two of each of the different kinds which are expected to be caught, such as linnets, goldfinches, greenfinches, woodlarks, red-polls, yellow hammers, titlarks, aberdavines, and bullfinches. Besides the *call-birds*, there are others denominated *flur-birds*, which are placed upon a moveable perch within the net, called a *flur*, and which can be raised or depressed at pleasure; and these are secured to the *flur* by means of a brace or bandage of slender silk string fastened round the body of the bird. The call-birds are disposed, at proper intervals, in cages, at a little distance from the nets; and as soon as they see or hear the approach of the wild birds, which they perceive long before it can be observed by the bird-catchers, they announce the intelligence, from cage to cage, with the greatest appearance of joy; and they proceed to invite them to alight, by a succession of notes, or short *jerks*, as they are termed by the bird-catchers, which may often be heard at a considerable distance. The moment that this call is heard by the wild birds, they stop their flight, and
descend towards the nets; and so great is th
cendancy and fascination of the call-birds, that
can induce the others to return repeatedly t
nets, till every bird in the flock be caught.—N
ingales are taken with small trap-nets, witho
aid of *call-birds*. These nets are not much
than a cabbage-net; are surrounded at the b
with an iron ring; and are baited with a meal-
from the baker's shop.—In fine sunny weather
larks are allured within reach of the clap-net
means of small bits of looking-glass fixed in a
of wood in the middle of the nets, and put i
quick whirling motion, by a string in the ha
the bird-catcher. Grouse and partridge m
taken in the evening, by observing where they
and drawing a net over them; or, in the day
by employing a steady dog to point at them
while their attention is fixed upon the anim
large net, drawn by one person at each end, m
sily be passed over them.

In the first volume of Vaillant's *Travels in A*
is described the following ingenious method o
curing birds alive, and without injuring their
mage. He put into his fusee a larger or
quantity of powder, as circumstanees required.
bove the powder he placed the end of a candle,
ming it well down; and then filled the barrel
water. With the musket loaded, in this mann
fired at the birds which he wished to procure
they were so stunned and wetted by the water,
be brought to the ground, and easily picked u
fore they could injure their feathers by strug
or recover themselves to fly away.

Jays, blackbirds, and magpies, but partic
the former, may be taken in the following ludi
manner: Take a tame jay into the woods
others of that species are known to resort, la
bird upon the ground on his back, and, with
pegs, pin down his wings in such a manner,
keep him fast without hurting him. Retire to
station, and watch the issue. The cries of th
while struggling for liberty, will attract all
own species in the neigbourhood; and, as the
fluttering and leaping around him, he will not f
his desperation, to seize with his bill and claw
one that may come within his reach, and to h
fast till you approach to seize the prey. Th
will return repeatedly to the spot; and thus,
the same bird, many captures may be succes
secured.

In the Orkney Isles, eggs and young birds ar
lected by the inhabitants, in a most daring and h
dous manner. They climb up rocky preci
more than 50 fathoms above the sea, wher
shelves or ledges are scarcely broad enough fo
birds to rest, or to form their nests; and, pa
from one ledge to another, collect the egg
birds, and descend again with the greatest ea
indifference. In most cases, however, they
the attempt from above; and are let down
rope frequently made of straw or hogs bri
which are less apt than those made of hemp, t
cut by the sharpness of the rocks. A single s
ant lets down his companion in this manner,
shifts the rope from place to place, according to

signals which he receives. His associate, in the mean time, "hovering in mid air," springs from the face of the rocks by the aid of a staff, to avoid the projecting cliffs, and thus conveys himself along from place to place, rifling the nests as he proceeds.

A similar method is practised in the Feroe Islands, where the cliffs are in many places 200 fathoms high. The fowlers provide themselves with a rope about 100 fathoms in length, which is fastened round the waist of one of their number, who is then lowered down the precipice by six associates; and a piece of board is laid on the margin of the rock to prevent the rope from being cut by the friction. The adventurer is, at the same time, furnished with a small line, by which he gives signals for his being raised, lowered, or moved from place to place; and with a strong thick cap to defend his head from the stones, which are frequently displaced by the shifting of the rope. With inconceivable dexterity he pushes himself with his feet several fathoms from the front of the precipice, surveys the haunts of the birds, and darts into the openings where he has discovered their nests. When these recesses are deep, he disengages himself from the rope, which he fastens to a stone; collects the booty at his leisure, and suspends himself as before. He will sometimes even spring from the rock, and, with a fowling-net fixed to the end of a staff, catch the old birds that are flying around their retreats. At other times the party go in a boat to the foot of the precipice; and one of the most daring, with a rope about his middle, and a long pole, with a hook at one end, in his hand, either climbs, or is pushed by his companions, to the nearest footing place. By means of the rope he draws up the other adventurers in succession, each provided with his cord and fowling staff. In this manner they proceed upwards, till they reach the habitations of the birds; and the booty is flung down into the boat, which is rowed along to attend their operations. They frequently divide themselves into pairs, and proceed in different directions; and when they discover the nests of the birds below their station, one of them suffers himself to be let down by his companion, depending upon his single strength for safety. In these perilous pursuits the fowlers often spend seven or eight days at a time, and lodge during the night in the recesses of the rock.

In Mexico and China aquatic birds are taken by the natives in the following very simple but ingenious manner. Empty gourds are left continually floating on the lakes, to which the birds resort, that they may be accustomed to approach them without alarm. The bird-catcher enters the lake with his body under water, and his head covered with a gourd; quietly advances to the ducks and geese that are swimming on the surface, and pulls them by the feet under the water, securing in this manner as many as he can carry away.

In some of the remoter parts of Russia, great quantities of gelenottes or grous are taken by a large funnel, or inverted cone, which is made of long birch twigs stuck in the earth, very near to each other, and forming an opening at the top, about a yard in diameter. In this opening is placed a wheel made of two circles, intersecting each other, surrounded with straw or ears of corn, and turning on an axis fastened to the sides of the funnel. Above the cone is a cross stick, which rests upon two long forks planted upright, and from which is suspended a bundle of ears of corn. The birds, first of all, perch upon this transverse piece of wood; and then descend to the corn placed upon the wheel. As soon as they alight upon one of the projecting parts of the circles, the wheel turns, and they fall headlong to the bottom of the trap.

In different parts of Italy, the wild pigeons, on their return from the northern and western countries of Europe, are caught by means of nets, which are stretched across the hollows of the mountains, through which the birds direct their course. These nets are hung upon trees or lofty poles, planted for the purpose; and, by means of a pulley, are made to drop in a heap upon the slightest impulse. A watchman is stationed, on a lofty circular turret, at a little distance from the place where the snare is laid; and when he observes the doves approaching, he slings a stone, or shoots an arrow trimmed with hawk's feathers above them. Upon this, the whole flock, apprehending the object as it is falling down to be a bird of prey, descend with the utmost speed, to pass under the trees; dash in a body against the net, which instantly falls to the ground; and are thus entangled in such a manner, as to become an easy prey to the active hand of the fowler. See a variety of other modes of bird-catching detailed in Pennant's *Birds of Great Britain*. *Encyclopedie Methodique. Arts et Metiers*, tom. v. p. 373. Reaumur, *Histoire des Insectes*, tom. vi. Buffon, *Histoire des Oiseaux*, particularly the articles *Allouette Spipolette*, *Rouge-gorge*, *Motteux ou cul-blanc*, *Mesange*, *Becasse*, *Pluvier*. (*q*)

Bird-Lime.

BIRD-LIME, a glutinous matter of a very peculiar nature, is employed for catching birds, mice, and other vermin; and prepared from different substances, in a great variety of ways. In former times, it was made chiefly from the berries of the misletoe of oak, which were first boiled in water, then pounded, and the water poured off, in order to carry away the seeds and rhind. In England, it is generally made from the middle bark of holly, which is boiled in water, seven or eight hours, till it become soft and tender. After the water has been drained off, it is laid in masses in the earth, covered with stones, and left to ferment during a fortnight or three weeks. When thus changed into a kind of mucilage, it is taken from the pit; pounded in mortars till reduced to a paste; washed and kneaded in river water till freed from all extraneous matters. It is left in earthen vessels, four or five days, to purify itself by fermentation; and is then put up for use or commerce. In every kingdom, however, and almost in every district, there is a different mode of preparing this substance; and some profess to make a secret of their peculiar process. The mode employed by M. Bouillon Lagrange is, to take a sufficient quantity of the second bark of holly, to bruise it well, and boil it in water four or five hours; to pour off the water, to deposit the bark in pits in earthen pans, to moisten it from time to time with a little water; to let it remain till it become viscous, and to

Bird-Lime. cleanse it by washing, when it has obtained a proper degree of fermentation.

Bird-lime may be procured from the young shoots of the common elder tree, and from the second bark of the *viburnum*, or wild vine; from the roots of hyacinth, narcissus, asphodel, and black bryony; from slugs, snails, and the pods of certain caterpillars; but the best is that which is made from the prickly holly, and which is of a greenish colour. That which comes from Italy is made from the misletoe; and that from Damascus is supposed to be procured from sebestins, as their kernels are frequently found amongst it. The bird-lime of commerce, in general, is seldom in a pure state, and is frequently a mixture of vegetable and animal substances.

The common kind of bird-lime readily loses its tenacious quality, when long exposed to the air, and particularly when subjected to moisture; but it may be rendered capable of sustaining the action of water, by the following process: Take a pound of common bird-lime, and wash it thoroughly with spring water, till its hardness be destroyed. Then pound it completely, that its water may be entirely separated; and, when it is well dried, put it into an earthen pot, with as much goose or capon's grease as will make it run. Add two spoonfuls of strong vinegar, one of oil, and a small quantity of Venice turpentine; and let the whole boil for a few minutes over a moderate fire, stirring it all the time. It is then ready for use; and is the only kind, that can be successfully used for snipes and other birds, which frequent wet situations.

When bird-lime is about to be applied to use, it should be made hot; and the rods or twigs should be warmed a little before they be dipped in it. When straws and cords are to be limed, it should be very hot; and, after they are prepared, they should be kept in a leather bag till used. In order to prevent bird-lime from being congealed by cold, it should be mixed with a little oil of petroleum; and, indeed, before the common kind can be used at all, it must be melted over the fire with a third part of nut oil, or any thin grease, if that has not been added in the preparation.

Bird-lime has generally been classed among the immediate productions of vegetables; and Fourcroy was the first person who considered it as of a glutinous nature. It has been carefully analysed by M. Bouillon Lagrange, and has been found to resemble gluten in many particulars; but differs from it essentially in the acetous acid which it contains; in being very slightly animalized; in the mucilage and extractive matter which may be obtained from it; in the great quantity of resin which it yields by means of nitric acid; and in its solubility in ether. See *Annales des Chimie*, tom. lvi. *Analyse de Glu, par* M. Bouillon Lagrange. Fontenelle *Hist. Acad. Scien.* 1720, p. 12. *Collection Acad.* tom. v. p. 170. *Philosophical Magazine*, vol. xxiv. *Dictionnaire de l'Industrie*, art. *Glu*. (*q*)

BIRD-ISLAND, the name of an immense rock in the Southern Pacific Ocean, discovered in 1788 by the commander of the Prince of Wales, who gave it this name from the vast flocks of birds by which it was frequented. It was visited by Vancouver in March 1794. Towards the north-east and west, it opposes an inaccessible and rugged front to the violence of the waves, which beat upon it with tremendous effect. To the south the height of the rock diminishes; and towards its western side there is a sandy beach, where it might not be difficult to effect a landing, under favourable circumstances. A little verdure enlivened this part of the island; but in every other quarter it is destitute of soil and vegetation. It is called *Modoo Manoo*, or the Isle of Birds, by the Sandwich islanders. It is only about three miles in circumference, and is situated about 117 miles from Onehow, one of the Sandwich isles. "From its great distance from the other islands," says Vancouver, "and its proximity to their islands, it seems to claim some distant pretensions to be ranked in the group of the Sandwich Isles." E. Long. 198° 8', N. Lat. 23°. See Vancouver's *Voyages*, vol. v. book v. chap. p. 136—140. (*j*)

BIRMAN EMPIRE.

Birman Empire. Situation and extent. THIS new empire is one of the most powerful states in Asia, and includes the ancient kingdoms of Ava, Pegu, and Arracan, with some other countries of inferior note. It is difficult to ascertain with precision the limits of this empire; but, according to the most accurate accounts, it appears to extend from 92° to 102° east longitude, and between 9° and 26° north latitude, and is about 1200 miles in length, and 700 in breadth. On the north it is bounded by Assam, Tibet, and China; on the west it is separated from the British dominions in India by a range of mountains, the small river Naaf, and the bay of Bengal; the southern and eastern boundaries have not yet been accurately ascertained.

Rise and progress. The kingdom of Ava, the original seat of the Birman government, was formerly subject to the king of Pegu; but about the middle of the 16th century, the Birmans excited a revolution in the latter kingdom, and they maintained their supremacy over it till about 1740, when several of the provinces revolted, and kindled the flames of a civil war, which was prosecuted on both sides with savage ferocity. Success was long doubtful; but at length the Peguers obtained several victories over the Birmans, and they pursued these advantages with so much vigour, that in 1752 they invested Ava, the capital. Disheartened by repeated defeats, the Birmans, after a short siege, surrendered at discretion; and the sovereign, the last of a long line of native princes, was made prisoner with all his family, except two of his sons, who effected their escape to Siam, where they met with a friendly reception, and were flattered with assurances

our. Having thus completed the
the king of Pegu returned to his
ig his brother to govern the capi-
ptive, whom he carried with him,
elly murdered. At first, matters
e of tranquillity and submission;
itants acknowledged the authority
and took an oath of allegiance to
rest, Alompra, the chief of a small
who possessed a spirit of enterprise
to the most arduous undertakings,
his views, though at the same time,
iope of emancipating his country,
best means of accomplishing his
in the neighbourhood about 100
on whose courage and fidelity he
he ventured with this handful to
of the conqueror, and being after-
ported by his countrymen, he in
ssession of Ava, the capital. A
ontest ensued; and though Alom-
r great disadvantages, and met with
et victory usually crowned his ex-
gth drove the enemy from the king-
in 1757 he even invested Pegu, the
queror. After some time, the city
iven up to indiscriminate plunder:
was made prisoner, and after being
for about 20 years, was cruelly put
f Alompra's successors. Having
e kingdom of Pegu, and annexed it
ionarchy, Alompra proceeded to
ibjection, the countries to the east-
ie fertile districts between Pegu and
: he also reduced Javoy under his
erwards proceeded to chasten the
upport and encouragement which
his enemies. After various achieve-
idvanced towards the capital of the
o days after the commencement of
taken ill of a disease which he fore-
nortal, and he therefore gave orders
retreat; but before he reached the
he died, May 15, 1760, in the 50th
gretted by his people, who at once
heir monarch and deliverer. Alom-
ed in the light of a soldier or a po-
tedly entitled to high respect. The
nsels secured what his victories ac-
ot more eager for conquest than at-
rovement of his territories, and the
subjects; he issued a severe edict
and prohibited the use of spiritous
t his empire: he reformed the courts
ng the power of the magistrate, and
to decide at their private houses on
r with regard to property, when the
a certain sum: and every process of
be decided in public, and every decree
eign of Alompra though short, was
his life had been prolonged, he
iave proved the benefactor of his
higher degree.

ounder of the Birman empire, was
succeeded in the throne by his eldest son Namdogee, who, after suppressing various insurrections, and promoting the internal improvement of the country, died in 1764. He left behind him an infant son named Mornien, but Shembuan, the uncle and natural guardian of the young minor, deprived him of the crown, and took the reins of government into his own hand. On ascending the throne, the new monarch declared war against the Siamese, and after various rencounters, they were completely defeated by his army in a general battle. The forces of Shembuan immediately proceeded to invest Siam, the capital of the kingdom; but as the fort was of considerable strength, the besiegers were content with maintaining a passive blockade, the favourite system of Birman warfare. In a short time the king of Siam, in despair, secretly withdrew from the fort, in order to avoid falling into the hands of the enemy; and eluding the Birman outposts, sought refuge among the hills, where he is said to have perished, though by what means is unknown. The Siamese, deserted by their sovereign, agreed to capitulate; the fortifications of the city were destroyed, and a governor was appointed over it, who took an oath of allegiance to the Birman monarchy, and engaged to pay an annual tribute. However, though they were beaten, the spirit of the nation was not subdued. The conqueror had no sooner withdrawn his army, than one of the king's relations returned at the head of a numerous troop of adherents, displaced the new government of Siam, and abolished the regulations of the Birman commander. Shembuan dispatched a new army to suppress the insurrection, but in consequence of the treachery and rebellions of the Peguese soldiers who composed it, the operations against the Siamese were completely suspended, and the nation was saved from destruction.

In the mean time, however, the Birmans had successfully repelled the invasion of their territories by the Chinese government, who, with the view of subjugating them to its dominion, sent in 1767 an army of 50,000 into one of the northern provinces. The troops of Shembuan advanced to meet them, and surrounded the Chinese on all sides, so that a retreat became impracticable, and to advance was desperate. In this situation the Birmans attacked the enemy with impetuosity, while, on the other hand, the defence made by the Chinese was equally resolute. After a conflict of three days, the latter, in an effort of despair, tried to force their way through one of the divisions of the Birman army. The attempt proved fatal. They sunk under the pressure of superior numbers, and the carnage that ensued was dreadful. Not an individual of the Chinese army returned home to relate the melancholy tale, and only about 2500 were preserved from the sword, who were conducted in fetters to the Birman capital. Various employments were assigned them, and they were encouraged to marry native women and settle in the country; circumstances which confer valuable privileges even on slaves taken in war.

Such were some of the principal events of Shembuan's reign. At length, after various other military exploits, in the course of which he subjected to a state of permanent vassalage several of the neighbouring provinces, he died in 1776, and was succeeded in the government by his son Chengenza. The new prince, unlike his predecessors, was the slave of his pleasures and the tyrant of his people. During his reign, the military operations of the Birmans appear to have been completely suspended, whilst the neighbouring nations, who had so recently experienced the power of their arms, felt no inclination to become the aggressors. At last, in consequence of his numerous acts of savage cruelty, a formidable conspiracy was excited against him, headed by one of his uncles: the conspirators surrounded his palace, and though he saved himself by flight, yet after various adventures, he was slain in 1782, and fell unlamented, as he had lived despised by his people.

Shembuan Menderagee, the head of the conspiracy, was the fourth son of Alompra, and had carefully concealed under an humble exterior, and an apparent love of retirement, ambition that aspired to the possession of the crown; and though Mornien, who was formerly deprived of the kingdom when a minor by his uncle Shembuan, and placed in retirement under the care of the priests, was now raised to the throne, he enjoyed his dignity only eleven days. Menderagee, who was also his uncle, seized on the reins of government, and made Mornien prisoner. Deposition and imprisonment, however, did not satisfy the usurper; but without assigning any cause, or granting even the form of a trial, the unfortunate nephew was, by his uncle's orders, drowned in the river between two jars, conformably to the Birman mode of executing members of the royal family. Desirous of extending his dominions, the new king in 1783 attacked the Rajah of Arracan, and in the short space of a few months accomplished the conquest of that kingdom, which, with its dependencies, was formed into a province of the Birman empire. He next directed his arms against Siam, which, since the attack by Shembuan, had enjoyed some respite from hostility, and was beginning to recover its ancient vigour. In his first attempt he was foiled, and being mortified with the disappointment, he resolved, as soon as possible, to retrieve the disgrace which his arms had sustained. With this view, he marched in the spring of 1786 at the head of 30,000 men; but he had scarcely entered the territories of the enemy, when he was opposed by the king of Siam, and after a furious engagement completely routed. In the following year the Siamese made an unsuccessful invasion of the Birman empire; and at last in 1793, they concluded a treaty of peace highly favourable to the Birman interests. Soon after this, some of the Birman troops made an incursion into the British territories, in search of some banditti who had taken refuge in our dominions. Though at first this circumstance had a threatening aspect, yet the robbers, as they were found guilty of the charges brought against them, were delivered up, and the whole affair was amicably settled. At the same time, this event furnished us with the opportunity of acquiring more accurate knowledge of a people whose situation, extent of territory, and commercial connections with British India, rendered a liberal intercourse with them highly desirable. In order to promote this important object, the governor-gener Sir John Shore, now Lord Teignmouth, sent Captain Symes on an embassy to the Birman court, an it was on this occasion that we acquired the princip information that we possess of the present state this empire.

The climate of the Birman empire appears to b very healthy and agreeable. The seasons are regula and the extremes of heat and cold are seldom experienced for any considerable length of time. Immediately before the commencement of the rains, the heat indeed becomes very intense, but it is only of short duration Towards the end of May, Colonel Symes found the thermometer at 98° about noon.

The soil of the southern provinces of the Birman empire is remarkably fertile, and produces as luxurious crops of rice as are to be found in the finest parts of Bengal; but in some parts extensive plains are to be seen, on which the vestiges of cultivation are evident, which have been desolated by the ravages of war during the contest between the Birmans and the Peguese, so that the finest territories in the world have in many places become the domain of the wild beasts of the forest. In the northern parts of the empire the country is irregular and mountainous; but the plains and valleys, particularly near the rivers, are exceedingly fertile. They yield excellent wheat, and the various kinds of small grain which grow in Hindostan, with most of the different species of esculent vegetables. Sugar canes, tobacco of a superior quality, cotton, indigo, and the various tropical fruits are natural products of this country. The art agriculture, however, is still in a state of imperfection; but this does not seem to arise so much fr want of skill in the people as from their present situation, which renders great exertion to procure subsistence by no means necessary. The Birmans are in state similar to that of a colony in a new territory land is cheap and abundant, while labour is procure with difficulty; and hence, they cultivate only the most fertile spots, and even then only in an indifferent manner, leaving the greater part of the work to nature, which has been very bountiful to this country. In some quarters, however, neat farms are to be seen the lands are fenced and divided into inclosures to receive the cattle, of which there are great abundance the fields are divided by thorn hedges; the lo grounds are prepared for rice, and the higher lan are planted with leguminous shrubs, or left for pasture. The cattle used in some parts of the countr for draft and tillage are remarkably good; they employ only two of them in the plough, which turns u the soil very superficially. In their large carts the put four strong oxen, which are driven at the gallo by a girl standing up in the vehicle, who manages th reins and whip with ease and dexterity. In consequence of many parts of the country remaining in state of nature, the woods are large and numerous affording an abundant supply of various kinds of timber. The monarch of the Birman forests, howeve is the teak tree, which grows in great plenty in th southern parts of the empire, near the large rivers and is considered as superior to the European oak. This species of wood is of peculiar importance to our

nents in India for ship-building, and is on this
nt one of the most valuable productions of the
ry.

e Birman empire abounds in minerals. There
veral mines of gold and silver in this country,
ie former metal is likewise found in the beds of
ns which descend from the mountains. Precious
are also met with in various parts of this coun-
s rubies, sapphires, amethysts, garnets, chryso-
jaspers, loadstone, and marble equal in quality
finest of Italy. The inferior minerals, as iron,
tin, antimony, arsenic, sulphur, are also found in
abundance. The Birmans have likewise natu-
ells of petroleum, similar to the coal tar for
Europe is indebted to the ingenuity of Lord
lonald. Captain Cox mentions, that at one place
are upwards of 500 pits or wells of this use-
roduction. The animals of this country cor-
nd in general with those of Hindostan, so that
will not require any particular description.

e manufactures of the Birman empire consist
y of cotton and silk goods, saltpetre, gunpow-
arious kinds of pottery, marble statues of the
they adore. At a certain village, Colonel Symes
hirty or forty large yards crowded with statu-
at work on images of various sizes, but all of the
personage, namely Gadama, sitting cross leg-
n a pedestal. The quarries, from which they
the materials, are only a few miles distant. The
e is brought to the village in blocks; and after
cut, the images are sold to the natives. The
st exceeded the human stature, and the price
id to be 100 tackals, or about 12 or 13 pounds
g; but some diminutive images were so low as
r three tackals. The workmen were civil and
unicative. Their tools were a chissel and a mal-
d they smooth the images with freestone and
Many of the idols were beautifully polish-
ich is said to be done by rubbing the marble
hree different kinds of stone; the first rough,
ond finer, and the third such as hones are made
The workmen afterwards use the palms of their
an operation which gives the images a trans-
clearness far surpassing the brightest polish
uropean marble ever exhibits. Of late years,
rmans have made rapid progress in the art of
ilding. Formerly they used only small vessels
ats; but, in consequence of their communica-
ith Europeans, they are now launching vessels
siderable magnitude. When the British em-
was at Raugoon, the principal port of the Bir-
Colonel Symes saw several ships on the stocks
00 to 1000 tons burden: three or four of the
belonged to English adventurers. Ships may
structed in this country at one third less than
Ganges, and for nearly one half of what they
cost at Bombay. The Birman shipwrights
to finish their work well; they are of an ath-
rm, and possess in an eminent degree that vi-
which distinguishes Europeans, and gives them
superiority over the enervated natives of Hin-
. It is said, however, that the ships of Pegu
t so firmly made as those constructed in our
The art of vitrification has long been known
East, but the inhabitants are unable to make so hard and transparent a substance as that which is brought from Europe. On the subject of this manufacture, Colonel Symes mentions the following curious and interesting fact: "The Birman monarch," says he, "who is a great admirer of this manufacture, was particularly desirous to introduce it into his own dominions; and supposing that every Englishman must be versed in the knowledge of making whatever comes from his own country, he sent a message to request that I would furnish his artificers with such instructions as might enable them to fabricate glass of a quality equal to what was made in England. Unluckily none of us happened to be skilled in the mystery of a glass-house; all, therefore, that we could do, was to explain the principles of the art, which Dr Buchanan obligingly undertook; and, in order to facilitate them in the acquirement, and guide them in the practice, I lent them the *Encyclopædia Britannica*, and pointed out the article where the process is fully explained. Baba Sheen, the second in authority at the port of Raugoon, and the Armenian interpreter, translated it into the Birman tongue."

Glass.

Commerce.

The commerce of the Birman empire is very considerable. An extensive trade is carried on between the capital and Yunan in China. The principal export from the Birman territory is cotton, of which it is said there are two kinds, one of a brown colour, of which nankeens are made, the other white like the cotton of India. This commodity is transported up the Irrawaddy in large boats, as far as a place called Barnoo, where it is bartered with the Chinese merchants, who convey it partly by land and partly by water into China. Amber, ivory, precious stones, betel nut, and the edible nuts, brought from the eastern archipelago, are also articles of commerce. In return the Birmans procure raw and wrought silks, gold leaf, preserves, paper, and some hardware utensils. There is also a considerable inland commerce carried on between the different parts of the interior, particularly in the necessaries of life. Several thousand boats are employed in transporting rice and salt from the southern provinces, to supply the capital and the northern districts. On the coast the Birmans possess several excellent ports, particularly Negrais, Mergui, and Raugoon. The imports into the latter place from the British settlements in 1794-5, Colonel Symes was informed, amounted to about £135,000 Sterling. They consisted chiefly of coarse piece goods, glass, hardware, and broad cloth: the returns were made almost wholly in timber. In order to encourage our trade with this country, the king, upon our embassy in 1795, granted several valuable privileges to our merchants. The Birmans are so sensible of the advantages of commerce, and so desirous of extending it, that of late years they have tolerated all descriptions of people, Pagans, Jews, Mahometans, Christians, the disciples of Confucius, and the worshippers of fire, and invited strangers of every nation to resort to their ports; and being free from the prejudices of cast which shackle their Indian neighbours, they permit foreigners to intermarry and settle among them. The children of strangers of every description born of a Birman woman become subjects of the state, and are entitled to the same privileges as if they had sprung from a line of Birman ancestry. In their

[illegible]

commercial transactions, the Birmans, like the Chinese, make no use of coin. Silver in bullion and lead are the current monies of this country; weight and purity are of course the standard value, and in ascertaining these the natives are exceedingly scrupulous and expert. Money scales and weights are all fabricated at the capital, when they are stamped and circulated throughout the empire, while the use of any other is prohibited. The bankers are also workers in silver, and assayers of metal. This is a very numerous class of people, and indispensably necessary, as no stranger can undertake either to pay or receive money without having it first examined by one of them. Every merchant has a banker of this description, with whom he lodges all his cash, and who receives a commission of one *per cent.* upon it, in consideration of which he is responsible for the quality of what passes through his hands; and there has been no instance, in which a branch of trust was committed by one of these bankers.

Principal cities.

In this place we shall introduce some description of the principal cities of the Birman empire, as it will illustrate the state of society and of the arts in this country. The seat of government has been often successively changed under different sovereigns. At present the capital is Ummerapoora, a city which was founded by Menderagee, soon after he ascended the throne, and which has speedily become one of the most flourishing places in the East. It is situated on a peninsula between a lake on the south-east, and a large river with numerous isles on the north-west, and with its spires, turrets, and lofty obelisk, &c. noting the royal presence, seems to rise like Venus out of the waters. The lake is called Tounzemahn, from a village on the opposite side, which is ornamented with tall groves of mango, palmyra, and cocoa trees. The number and singularity of the boats which are moored in the lake, and the surrounding amphitheatre of lofty hills, conspire to render the scene grand and interesting. The fort is an exact square, with public granaries and store-rooms, and there is a gilded temple at each corner nearly 100 feet in height, but far inferior to others in the vicinity of the capital. In the centre of the fort stands the royal palace, with a wide court in front, beyond which is the hall of council, supported by about eighty pillars disposed in eleven rows. The buildings of this city are chiefly of wood.

Ava, the former capital, is about four miles from Ummerapoora; but since the removal of the seat of government to that city, has fallen into a state of decay. "The walls," says Colonel Symes, "are now mouldering into ruin, ivy clings to the sides, and bushes suffered to grow at the bottom, undermine the foundation, and have already caused large chasms in the different faces of the fort. The materials of the houses, consisting chiefly of wood, had, on the first order for removing, been transported to the new city of Ummerapoora: but the ground, unless when it is covered with bushes or rank grass, still retains traces of former buildings and streets. The lines of the royal palace, of the grand council hall, the apartments of the women, and the spot on which the piasath or imperial spire had stood, were pointed out to us by our guide. Clumps of bamboos, a few plantain trees, and tall thorns, occupy the greater p the area of the lately flourishing capital. We served two dwelling houses of mortar and brick, roofs of which had fallen in. These, our guides s had belonged to foreigners. On entering one, found it inhabited only by bats, which flew in faces, whilst our sense of smelling was affected by t filth, and by the noisome mildew that hung upon walls. Numerous temples, on which the Bir never lay sacrilegious hands, were dilapidating by t It is impossible to draw a more striking picture desolation and ruin."

Pegu was formerly capital of the kingdom of t name: but after the conquest of it by Alom who demolished the buildings, and razed the w to the ground, it fell into decay. But after M deragee ascended the throne, he endeavoured to c ciliate the native Peguese, by permitting them to build their ancient city, within the site of whic new town has accordingly been reared. It is situ in 17° 40′ N. Lat. and 96° 11′ 15″ E. Long. T number of inhabitants appears to be about six or se thousand.

Besides these cities, there are many others of c siderable importance. Raugoon, one of the princi ports in the kingdom, was founded by Alompra, a is estimated to contain about 30,000 inhabita Towards the mouth of the river Pegu stands Siria formerly one of the chief ports of that kingdom, a which carried on a considerable commerce when possession of the Portuguese. Martaban was anoth sea-port of considerable eminence, until the harbou was impeded by order of the Birman emperor. Th grand river Irrawaddy, the course of which is abou 1200 miles in length, is adorned with numerous towns and villages. Persain or Bassian stands on it western branch. At a considerable distance to the north is Prome, celebrated as the scene of many long sieges and bloody battles, the population of which is said to exceed that of Raugoon. Chagaing, opposite to the capital, was once a city of imperial residence, and is still a principal market for cotton. Pagah [illegible] celebrated for its numerous temples, but is now [illegible] state of decay. Towards the north and west [illegible] are also Arracan, Quangtong, Barnoo, Mu[illegible] Monchaboo.

Of the population of the Birman empire [illegible] no accurate information. Colonel Symes, h[illegible] says, that he was credibly informed the nu[illegible] cities, towns, and villages, amounted to 800[illegible] sive of Arracan. Now, if this be true, and [illegible] pose each of them, on an average, to co[illegible] houses, and every house six persons, the p[illegible] will amount to 14,400,000 persons. Few [illegible] habitants, however, live in solitary houses; [illegible] ly form themselves into small societies, [illegible] dwellings, thus collected, compose their vi[illegible] therefore, he concludes, that if we estimate [illegible] ate population, including Arracan, at 17,000[illegible]00,00 not probably exceed the truth.

In their features the Birmans bear a g[illegible] reater re blance to the Chinese than to the nati[illegible]es of Hin tan. The men are not tall, but they [illegible] re active an athletic, and have a very youthful appe[illegible] arance, as in- stead of using the razor, they pluck o[illegible] t their bea

eir thighs and arms with various fan-
nd figures, which they consider as a
ı against the weapons of their enemies.
ıpecially in the northern part of the
er than the Hindoo females; but they
ately formed, and, in general, they are
pulency: their hair is black, coarse,
an early age, the girls are taught to
s in such a manner as to make them
d. When the arm is extended, the
int is protruded, and the external part

Neither the men nor the women are
heir persons as the Hindoos, among
ıblution is a religious and moral duty.
the character of the Birmans forms a
t with that of the natives of India, from
separated only by a narrow range of
l yet, notwithstanding the small extent
the physical difference between them
have been greater if they had been si-
pposite extremities of the globe. The
ively, inquisitive, intelligent race; and,
le, active, irascible, and impatient. In
they display the ferocity of barbarians,
ll the softness, humanity, and tender-
ed society. They inflict the most sa-
on their enemies; as invaders, deso-
heir steps, for they spare neither age
ı their own country they assume a dif-
r; then they manifest the spirit of be-
extend their aid to the sick, the in-
ged. In this country beggars are ne-
f any individual is unable to procure
his own labour, it is provided for him
ilial piety is inculcated as a sacred du-
cepts are religiously observed.

houses of the Birmans are constructed
e and cheap materials. The use of
, is prohibited by government, so that
ructed of wood; but, in other respects,
with sufficient attention to convenien-
ll raised from the ground, either on
or bamboos, according to the size of
In consequence, however, of the houses
ted of such combustible materials, the
under continual apprehension of fire,
they take every precaution. The roofs
vered; and, at every door, there is a
with an iron hook at the end of it, to
thatch. There is also another pole,
grating at the extremity, to suppress
pressure; and almost every house has
filled with water, standing ready upon
a number of firemen patrole the streets
ht, to put out all fires and lights af-
our. The art of masonry has not, in
much cultivated among the Birmans,
n structures have superseded the solid
rick and mortar; and it is a singular
that though well constructed arches of
to be seen in many of the ancient tem-
e workmen are no longer able to turn

dress of the nobles is represented as
. It consists of a long robe of flowered satin, or of velvet, reaching to the ankles, with an open collar, and loose sleeves. Over this there is a scarf, or flowing mantle, which hangs from their shoulders; and on their heads they wear high caps of velvet, either plain, or of silk embroidered with flowers of gold, according to the rank of the owner. Ear-rings are worn by the men, and some persons of condition use tubes of gold, about three inches long, and as thick as a large quill, which expands at one end like the mouth of a trumpet; others wear a heavy mass of gold, beaten into a plate, and rolled up. This lump of metal forms a large orifice in the lobe of the ear, and drags it down by its weight to the extent of two inches. Men of rank wear, in common dress, a tight coat, with long sleeves, made of muslin, or of very fine nankeen, and a silk wrapper that encircles the waist. The working class are usually naked to the middle; but, in cold weather, they sometimes make use of a mantle or vest of European cloth. When women of quality go abroad, they wear a silk sash like a long shawl, which crosses their bosom, and is cast over the shoulder, so as to flow gracefully on each side. The lowest class of females often wear only a single garment, in the form of a sheet, which, wrapped round the body, and tucked under the arm, crosses their breasts, which it scarcely conceals, and descends to their ankles, but in such a manner that the legs protrude from under it when they attempt to walk. Women in full dress stain the palms of their hands and their nails of a red colour, by means of a vegetable juice, and strew on their bosoms powder of sandal wood, or of a particular kind of bark, with which some of them rub their faces. Both men and women tinge the edges of their eyelids and their teeth of a black colour.

Food.

In their food, the Birmans, compared with the Hindoos, are gross and uncleanly. Although their religion prohibits the slaughter of animals in general, yet they apply the interdiction only to those that are domesticated. All game is eagerly sought after, and is publicly sold in the market. Reptiles also, as lizards, guanas, snakes, constitute part of the food of the lower classes, and they are also extremely fond of vegetables. The higher ranks live with greater delicacy, although their fare is never sumptuous.

With regard to their various circumstances, particular attention is paid to the rank of the individuals. In their houses, no one dare assume a mode of structure to which he is not legally entitled, under the penalty of a most severe punishment, which is never remitted. This subordination of ranks among the Birmans is maintained, not only with regard to their houses and dress, but even in their domestic instruments; the shape of their betel box, which is carried by an attendant before one of noble birth wherever he goes, his ear-rings, his cup of ceremony, the accoutrements of his horse, and even the metal of which his spitting box and drinking cup are made.

Marriages.

Among the Birmans, marriages are not contracted until the parties attain the age of puberty. When a young man wishes to marry a girl, her mother, or nearest female relation, first makes the proposal in private; and, if it is well received, a party of his friends afterwards proceed to the house of the lady's parents, with whom they adjust the marriage portion, On the morning of the bridal day, the bridegroom sends the maiden three lower garments, three sashes, and three pieces of white muslin, with such jewels, ear-rings, and bracelets, as his circumstances will afford. The parents of the bride prepare a feast, and formal writings are executed. The young couple eat out of the same dish, and the bridegroom presents the bride with some læpack, or pickled tea, which she accepts, and returns the compliment, which ends the ceremony. The law prohibits polygamy, and recognises only one wife; but concubinage is admitted to an unlimited extent. The concubines reside in the same house with the legitimate wife, and are obliged by law to perform the menial services of the family; and when she goes abroad, they attend her, bearing her water flaggon, betel box, fan, &c. When the man dies, his concubines, if bound in servitude to him, become the property of the surviving widow, unless he has emancipated them by a specific act previous to his decease.

Prostitution.

In the Birman empire, prostitution is admitted, and is often attended with circumstances of peculiar wretchedness. Many who follow this course of life are not at their own disposal, nor do they receive the earnings of their unhappy profession. According to the Birman laws, if a person contracts a debt which he is unable to pay, he becomes the property of his creditor, who may claim the insolvent debtor as his slave, and oblige him to perform menial service until he liquidates the debt; nor does the unhappy man suffer in his own person only, for his immediate relations are often included in the bond, and are liable to be attached and sold to discharge the obligation. In consequence of this inhuman law, whole families are often plunged into misery and ruin. Innocent women are dragged from the comforts of domestic life, and, on account of the folly or misfortune of the master of the family, are sold to the superintendant of the Jackally, who, if they possess particular attraction, pays a valuable consideration for them, and reimburses himself by the wages of their prostitution. Indeed, the lower classes of the Birmans make no scruple of selling their daughters, or even their wives, to foreigners who come to pass a temporary residence among them: this, however, reflects no disgrace on any of the parties, and even the woman is not dishonoured by the connection. But when a man leaves the country, he is not at liberty to carry his temporary wife along with him; and even female children, born of a Birman mother, are not allowed to be taken away. Men may emigrate from the country; but the Birmans think, that the expatriation of women would impoverish the state, by diminishing the sources of population. On this point the law is extremely rigorous. Before a ship receives clearance, it is carefully searched by the officers of the customhouse; and even if their vigilance should be eluded, the woman would quickly be missed, and should the vessel ever return to a Birman port, the property would be confiscated, and the master subjected to fine and imprisonment.

State of the women.

The Birmans do not shut up their women in the walls of a haram, or surround them with guards, like most other nations of the East. Such low jealousy forms no part of the character of this extraordinary
people. They do not conceal their wives or dau
ters from the eyes of men, but allow them to hav
free intercourse with the world as the rules of Eu
pean society admit of. Infidelity, however, is
common among the Birman women. Indeed, t
have in general too much employment to allow t
for the corruption of their minds, for even wome
the highest rank seldom sit in idleness at home.
female servants, like those of the Grecian dame
antiquity, ply the various labours of the loom, wh
the mistress of the house superintends and dir
their industry. Col. Symes mentions, that, on
casion of a formal visit to the mother of the pre
queen, they observed, in one of the galleries of
palace, three or four looms working by the damsel
his household. Indeed, weaving is chiefly a fem
occupation, and most females make all the cotton
silk cloth that is necessary for domestic consumpti
In some respects, however, women are treated a
they did not hold the same place in the scale of c
tion as the men. The evidence of a female is
received as of equal weight with that of a man,
they are not allowed to ascend the steps of a court
justice, but are obliged to deliver their testimony
the outside of the roof.

Among the public amusements of the Birma
are boxing matches, fireworks, processions, exh
tions of dancing, puppet shows. They are parti
larly fond of dramatic entertainments. At P
there is a theatre, in an open court, which is sp
didly illuminated by lamps and torches when thea
cal performances are exhibited. Indeed, at all fe
vals they have dramatic entertainments, consisting
music, dancing, and action, with a dialogue in rec
tion. The higher ranks are likewise particula
fond of chess. The board which they use in t
game is exactly similar to ours, containing 64 squar
and the number of troops the same, sixteen on ea
side; but the names, the power, and the disposal
them, differ essentially. On the last day of the ye
a curious custom prevails throughout the Birm
empire. To wash away the impurities of the pa
and commence the new year free from stain, w
men on this day are accustomed to throw wat
on every man they meet, and the men have the pri
lege of retaliating. This licence gives rise to a gr
deal of harmless merriment, particularly among t
young women, who, armed with large syringes a
flaggons, endeavour to wet every man that goes alo
the streets; and, in their turn, receive the same co
pliment with perfect good humour. Dirty wat
however, is never employed; nor is a man allowed
lay hold of a woman, but he may cast as much wa
over her as he pleases, provided she has been t
aggressor; but if a woman warns a man that
does not mean to join in the diversion, it is consid
ed as an avowal of pregnancy, and she passes witho
molestation.

In the Birman empire, funerals are solemnized wi
great parade, and various external demonstrations
grief. The corpse is placed on a bier, and carri
on men's shoulders; the procession moves slow
along; the relations attend in mourning; and w
men, hired for the occasion, precede the body, a
chaunt a dirge-like air. The Birmans burn th

unless the person is a pauper; in which case,
ither buried, or cast into the river, as the cere-
of burning is very expensive. The bier is pla-
a funeral pile six or eight feet high, made of
of dried wood laid across each other, with in-
to admit a due circulation of air, and to in-
the flame. The priests walk round the pile,
g prayers to Godama, until the fire reaches
dy, when the whole is quickly reduced to
The bones are afterwards collected and depo-
a grave. Persons of high rank, such as the
ecclesiastic of a province, the prime minister,
ember of the royal family, are embalmed, and
emains are preserved for six weeks, or two
, after which they are committed to the fune-
. During this period the body lies in state
e monastery; but at the capital it is placed in
d saloon, beautifully ornamented with gilding,
clusively appropriated to this purpose. Honey
to be the principal ingredient which they em-
preserve the body from putrefaction.

des the Birmans, Col. Symes mentions a sin-
lescription of people called Carayners, who in-
lifferent parts of the country, particularly the
provinces of Dalla and Bassieu, and of whom
re several societies in the districts adjacent to
on. They were represented to him by a Ca-
missionary as a simple, innocent race, mild in
nanners, exceedingly hospitable to strangers,
g a language distinct from that of the Bir-
nd entertaining rude notions of religion. They
most industrious subjects of the state, and
great part of the provisions used in the coun-
griculture, gardening, and the care of cattle,
nost their only occupations. Their villages
select community, from which they exclude
r people; and they never reside in cities, in-
le, or marry with strangers. They profess
ctly observe the principle of universal peace,
gaging in war, or taking part in contests for
n; a system which necessarily places them in
on to the ruling power of the day. Of late
owever, they have been much oppressed by
at Birman landholders; in consequence of
numbers of them have withdrawn into the
ns of Arracan.

erature the Birmans have made considerable
s; for though they have not explored the
of science, or reached to superior excellence
ne arts, yet, in general, they are certainly
igent people. The knowledge of letters is
ly diffused among them, that there are no
es, few of the peasantry, or even of the com-
termen, who cannot read and write the vul-
gue. Few, however, are versant in their books
nce, which, containing many Sanscrit terms,
g often written in the Pali text, are above the
hension of the multitude. The Birman language
s thirty-three simple sounds, to represent which,
habet consists of an equal number of distinct
ers, exclusive of various marks and contrac-
which supply the place of long and short
diphthongs, &c. The Birmans write like
ans, from the left to the right; and, though
ave no distinguishing place between their
words, they mark the pauses of a full sentence, and the full stops. Their letters are distinct, and their manuscripts are, in general, very beautiful. The common books of the Birmans, like those of the Hindoos, are composed of the palmyra leaf, on which the letters are engraved with a style; but they are much superior to those of the Western continent, in the neatness of the execution, and in the ornaments which decorate them. Books, in the Pali text, are sometimes composed of thin stripes of bamboo, delicately plaited and varnished over in such a manner as to form a smooth and hard surface, on a leaf of any dimensions. This surface is afterwards gilded, and the sacred letters are traced upon it in black and shining japan: the margin is illuminated by wreaths and figures of gold, on a red, green, or black ground. In every monastery there is a repository of books, which are usually kept in lacquered chests. When at the capital, Colonel Symes paid a visit to the royal library, of which he gives us the following interesting description. "It is," says he, "a large brick building, raised on a terrace, and covered by a roof of a very compound structure. It consists of one square room, with an enclosed virando, or gallery, surrounding it. The room was locked, and, as we had not a special order for seeing it, the person who had the care of the library, said that he was not at liberty to open the doors, but assured us there was nothing in the inside different from what we might see in the virando, where a number of large chests, curiously ornamented with gilding and japan, were ranged in regular order against the wall. I counted fifty; but there were many more, probably not less than a hundred. The books were regularly classed, and the contents of each chest were written in gold letters on the lid. The librarian opened two, and shewed me some very beautiful writing, on thin leaves of ivory, the margins of which were ornamented with flowers of gold, neatly executed. I saw also some books written in the ancient Pali, the religious text. Every thing seemed to be arranged with perfect regularity; and I was informed that there were books on divers subjects; more on divinity than any other: but history, music, medicine, painting, and romance, had their separate treatises. The volumes were disposed under distinct heads, regularly numbered; and if all the other chests were as well filled as those that were submitted to our inspection, it is not improbable, that his Birman majesty may possess a more numerous library than any potentate from the banks of the Danube to the borders of China."

Books.

Royal library.

Books in history.

To this general account of the literature of the Birmans, we may add a few particulars relative to some of the arts and sciences. They are said to possess many historical works, containing an account of the lives and actions of the different families of their princes; but they are very fabulous, and abound with omens and prodigies. They have also translations of the history of China and Siam, and of the kingdoms of Kathee, Ko-shampyee, Pagoo, Saymmay, and Layuzayu. In *medicine*, the Birmans have several books. They divide diseases into ninety-six genera; and of these several are subdivided into many species. They are acquainted with the use of

Medicine.

Surgery.

Law.

Poetry.

mercury in the cure of the venereal disease; but the manner in which they employ it is neither safe nor certain. They make a candle of cinnabar and some other materials, and setting fire to it, the patient inhales the fumes with his nostrils; but he is seldom able to persevere long in this course, as it always produces a want of appetite, and extreme languor. Of the animal kingdom, mummy is a favourite medicine; but the greater part of the Birman remedies are taken from the vegetable creation, especially those of an aromatic nature. They are well acquainted with the plants of the country; and for a great number of them have appropriate names. On the whole, however, the practice of their physicians is almost entirely empirical; and, accordingly, they are not held in high estimation among their countrymen. There is a curious custom, mentioned by Dr Buchanan, with regard to this class of men. If a young woman appears to be dangerously ill, the physician and her parents frequently enter into an agreement, by which he undertakes to cure her. If the doctor is successful in this, he takes her as his property; but if she dies, he pays a certain sum for her to the parents: for in the Birman empire no parent gives away his daughter, either as a wife or concubine, without some valuable consideration. In *surgery*, the skill of the Birmans extends only to the dressing of wounds and setting of bones. Of late, indeed, they have introduced from Arracan the art of inoculation for the small-pox. The practice, however, does not appear to have become general, as a very great proportion of the people are marked by that disease. The Baptists, who have for some years laboured with so much success in propagating Christianity in Bengal, have lately sent a mission to the Birman empire; and, in 1808, one of the missionaries, Mr Felix Carey, introduced the vaccine inoculation into the city of Raugoon. He performed the operation on a considerable number of people, and, among others, the family of the governor, so that we fondly hope, this inestimable discovery will soon extend through the empire, and prevent the future ravages of the natural pox. On *law* the Birmans have many treatises, particularly the Institutes of Menu, and copious commentaries upon them. The code in common use is said to have suffered several alterations and additions by the decrees of various princes. The king who sat on the throne when the British embassy was sent to this country, was a very intelligent prince, and had caused the Institutes of Menu to be translated from the English of Sir W. Jones. He must therefore have heard of what is pursued among the Europeans, at least in oriental literature; and we may hope that some more useful books may attract his notice, and promote the diffusion of knowledge among his people. The Birmans are extremely fond of poetry and music. They have epic as well as religious poems, of high celebrity; and they are fond of reciting, in heroic numbers, the exploits of their kings and generals. It is said, that the prowess of the great Alompra, the deliverer of his country, is celebrated in verses not unworthy of his courage and his fortune. The members of the British embassy saw one of their dramatic representations at Pegu, and gave it considerable praise. The logue was spirited, without rant; the action animated without being extravagant; and the d of the principal performers were showy, yet be ing. Music is a science which is also held in c derable estimation throughout the Birman em and is cultivated more generally than in India.

The manner in which the Birmans divide tim at once a proof of the progress and the defe their knowledge. The space in which the finge be raised and depressed, is called *charazi*; te them make one *piaan*; and six piaans one *pizan* about a minute. The day commences at noon, is divided into eight portions, of about three h each. Their divisions of time are ascertained machine resembling the hour-glass, and somet by a perforated pan placed in a tub of water. T are announced by a stroke on an oblong drum, w is always placed near the dwelling of the chief gistrate of the town or village. It is comm raised on a high bamboo stage, with a roof of to protect it from the weather. The edifice at royal palace in the capital is of masonry, and is lofty; so that the sound is said to be distinctly veyed to the remotest parts of the city. The man year is divided into twelve months, which sist alternately of 29 and 30 days; so that an nary year consists only of 354 days. In or therefore, to complete a solar revolution, they in calate every third year a month of 30 days; an that year they add other three days to certain of months: but, as every fourth year will still occa the difference of a day, as in our bissextile y their style has been frequently altered by arbit authority. His present Birman majesty, howe is so desirous to ascertain and establish, by accu tables, a permanent and invariable measurement time, that he made application to the governor neral of India to send to his capital a Bramin ski in astronomy, to assist the deliberations of his co cil of professors, among whom his majesty alw presides in person; and he is said to be no inco derable proficient in the science of astronomy. manner in which the Birman month is subdivided probably peculiar to this nation. Instead of reck ing the days progressively, from the commencem to the close of the month, they advance no fur than the full moon; from which they recede, by trogressive enumeration, until the end of the mo The month is also subdivided into four weeks seven days each; and the eighth day of the inc ing moon, the fifteenth or full moon; the eight the decreasing moon, and the last day of the m are set apart by the Birmans as sacred festivals. these hebdominal holidays no public business is tr acted, and mercantile engagements are suspen and the strict observers of them take no susten between the rising and the setting of the sun: but latter instance of self denial is not very common, is rarely practised, except in the metropolis, the appearance of sanctity is sometimes assumed the crafty as the means of attaining promotion. sovereign himself is a great favourer of the aus ties of the Birman religion; and his chief min has for many years, on the Birman Sabbath, abs ed from food, so long as the sun appeared above horizon.

With regard to religion, the Birmans are wor it is an abuse of time to perform any of the common functions of life which, so long as they occupy attention, must divert their minds from the abstract contemplation of the divine essence. They receive contributions of food from the laity, and prefer what is cooked to not. Each convent sends forth a certain number of its members, who walk at a quick pace through the streets, carrying a box in which the donations are deposited. During their walks they never cast their eyes around them, but keep them fixed on the ground; they do not stop to solicit, and seldom even look at the donors, who appear more desirous to bestow than they are to receive. The Rahaans eat only once a day, namely, at the hour of noon; and as a much larger quantity of provisions is commonly procured than is sufficient for the members of the convents, the surplus is disposed of to needy strangers, or the poor scholars, who daily attend them for instruction in letters, and in the duties of religion and morality. From the number of convents in the neighbourhood of Raugoon, the number of priests must be very considerable. Colonel Symes was informed they exceeded 1500; but this must include those in their noviciate. Formerly, it is said, there were also nunneries of virgin priestesses, who, like the Rahaans, wore yellow garments, cut off their hair, and devoted themselves to chastity and religion; but these societies were long ago abolished, as injurious to the population of the state.

The temples of Godama are generally of a pyramidal form, and are supposed to contain some relics of the god, as a tooth, a bone, a hair, or a garment. The pyramids are often of an immense size: they are constructed of solid brick-work, plastered over, and generally placed on a prodigious elevated terrace. The base of the pyramid is frequently surrounded by a double row of small ones; and the summit of the whole is always crowned with umbrellas made of a combination of iron bars, into a kind of filagree work, and adorned with bells. Many of these pyramids are from three to five hundred feet high. In the larger temples, the umbrella, with at least the upper part of the pyramid, and often the whole, is entirely gilded over. Other temples, of nearly a similar structure, but hollow within, contain images of Godama, to which the adoration of his disciples is directed; however, the greater number of the images are placed in a kind of chapels which surround the large pyramids, containing the relics of Godama. In these figures, the god is always represented as a young man, of a placid countenance, and generally in the dress of a Rahaan. His postures are various. The most common is that of sitting cross-legged upon a throne, with his left hand resting upon his leg, and holding a book, and with his right hand over his knee. The images of Godama are of various materials, as clay, copper, silver, and alabaster. Many of them are completely gilded and ornamented with paintings of flowers. The size also of these images varies exceedingly. Some are not above six inches high, and others are of a most colossal size. Dr Buchanan mentions, that he saw an image at Ava consisting of one solid block of pure [illegible] and in a sitting posture. He had no opportunity of measuring its dimensions; bu
gers appeared to be about the length and t
of a large man's thigh and leg, from when
idea may be formed of the immensity of the

Besides attending to their private devotio
customary among the Birmans to present offe
the temples. These are very various; boil
fruits, especially the cocoa nut, flowers nat
artificial, and a variety of curious figures,
paper, gold leaf, and the cuttings of the co
kernel, are the most common. It is also ver
mary for the rich to offer elegant white u
with golden ornaments, large slippers, canes,
and all manner of utensils gilded, and of t
materials. Instead of these costly offerings,
content themselves with presenting imitations
in paper. These gifts are placed on altars
wooden benches before the god or the temp
the eatables become a prey to the dogs or th
People who have been in danger by water,
models of boats or ships, some of which are
with considerable neatness. One of the most
ways for a person to express his devotion, is
patch of a temple, in consequence of which
them have a very motley appearance. The
ficence of the king in this respect has been
tensive. Dr Buchanan was told, that he is a
at the expense of nearly 86,805℔ weight of si
this purpose. In no case do the Birmans offer
sacrifices.

In the Birman empire, the most liberal to
of religion prevails. In the same street may b
the solemn voice of the Muezzin calling the
to early prayers, and the bell of the Portugu
pel tinkling a summons to the catholic Ch
Processions meet and pass each other without
or receiving the smallest offence. The Birma
trouble themselves about the religious opinion
sect, nor disturb their ritual ceremonies, p
they do not interfere with the peace of soc
meddle with their own deity Godama. Som
the natives have embraced the catholic religion
does not appear that any persecution has been
on this account. The catholics have three p
worship at Raugoon, but the congregations
very large. In no capacity can any one resid
Birman empire with less suspicion than as a
of religion. Persons sustaining this characte
ther Christian, Mahomedan, or Pagan, have
privileges by order of government than thos
other capacity.

In this country the form of government is d
but still the emperor is accustomed to consult
cil of ancient nobles. There is no country
East in which the royal establishment is arran
such minute attention as in the Birman cou
splendid without being wasteful, and numero
out confusion. There are different officers b
the affairs of government in its various dep
are transacted. The Birman government ha
reditary dignities or employments; for on t
of the possessor, all honours and offices reve
crown. The order of nobility has different
which are distinguished by the number of

mpose the chain which is the badge of the
No subject is ever honoured with a higher
ıan 12, and the king alone wears 24.

irman system of jurisprudence is replete with
rality, and is distinguished above the Hindoo
its perspicuity and good sense. It provides
for almost every kind of crime that can be
d, and adds an ample chapter of precedents
ions to guide the inexperienced in cases of
d difficulty. The trial by ordeal, however,
eful to this code; but it prevails in all coun-
re the Hindoo religion is professed, and is as
s their records. An instance of the exercise
ode of trial is mentioned by Colonel Symes.
men having litigated a small property in a
justice, and the judges finding it difficult to
ie question of right, it was agreed to refer
er to the issue of an ordeal. The parties,
by the officers of the court, the Rahaans,
ltitude of people, repaired to a pond. After
rayers and ceremonies, the two women enter-
ond accompanied by two or three men, one
placed them close to each other, and put a
their heads, which he pressed down till they
h immersed at the same instant. After con-
out of sight for about a minute and a half,
ıem being nearly suffocated, raised her head,
ie other continued to sit on her hams at the
but was immediately lifted up by the man;
ich, an officer of the court pronounced judg-
ıer favour; and of the equity of the decision,
sent seemed to entertain the smallest doubt.
ctice, however, and that of imprecation, are
ng ground, and have of late years been dis-
ınced by the judicial courts both of India and

The criminal jurisprudence of the Birmans
in particular cases, but rigorous in others.
commission of theft does not incur the pe-
death unless the amount stolen is above 800
or about £100 sterling, or is attended with
cumstances of atrocity, as murder or mutila-
ı the former case, the culprit has a round
printed on each cheek by gunpowder and
ition, and on his breast the word *thief*, with
le stolen; for the second offence he is de-
f an arm; but the third inevitably produces
unishment. Decapitation is the mode by
iminals suffer, and in the performance of it
an executioners are exceedingly skilful. In
nistration of public affairs, the Birman go-
does not allow of privacy or concealment.
thy of remark, that when the British ambas-
d obtained from the emperor the establish-
certain regulations with regard to our com-
nd had returned to the port of Raugoon, the
of that district informed him that the order
publicly read and regulated on the follow-
adding, that the records were also open to
ic inspection, and that whosoever chose might
me procure a copy, by paying a trifling fee
fficers of the court.

punishments which thieves, and those who
irits, &c. meet with in this country, are very
and severe. Within a few days, the Baptist
ries saw the punishment of beheading, of cutting off the legs, of crucifying, and of pouring boiling lead down the throat. In the Oriental Star, a Calcutta newspaper for Jan. 23, 1808, there is the following account by an English gentleman recently arrived from Raugoon. The viceroy of that city, whose son's head had been cut off at Ava for chewing opium, had upon his arrival at the latter place, just before he landed, drawn his sword on board a boat, and thrown the scabbard into the river. His attendants remarking this extraordinary act, asked him the cause of it. His reply was, "my sword shall never be sheathed till it has revenged the death of my son." A man for chewing opium was put to death by crucifixion, in which red hot nails were used. In this position his belly was ript up, and in that horrid situation he was left to expire. His entrails lying at his feet, were immediately devoured by crows and vultures, several hours before the unhappy man ceased to breathe, and of which he seemed to be sensible. Another unhappy wretch for getting drunk, had hot lead poured down his throat in small quantities of about half a glassful: the two first caused a strong smoke to issue from his mouth, of which he was apparently sensible, but the third dose put an instant period to his existence. Another culprit for a similar crime was sentenced to be roasted alive, and the execution was to take place a few days after the writer's departure from Raugoon. Two others, one who had run away from the Birman army, and one whose father had also deserted, but who had not been taken, had their legs cut off above the knees, were also nailed up by their hands with red hot nails, and the hair of their heads tied fast up to a pole, and in this situation they were left to bleed to death. These miserable wretches remained alive for some hours, during which their piercing cries were distressing beyond expression, so that not an inhabitant in the place had any rest the whole night. The wives and children of the latter unhappy sufferers were to be blown up three days after. It seems that the viceroy, who ordered these dreadful punishments, had, during a long administration, executed the duties of his office with the greatest mildness and benevolence, screening many offenders from the rigour of the barbarous law of the country; but the execution of his son by the court of Ava had driven him to the highest pitch of desperation, and caused him to vow, that the bloody criminal code of his country should be enforced to the utmost extremity.

Forces.

The Birmans are a nation of soldiers; every man in the kingdom being liable to be called upon military service, and war is deemed the most honourable occupation. The regular military establishment of the nation, however, as among our ancestors in feudal times, is very inconsiderable, consisting only of the royal guards, and as many troops as are necessary to preserve the police of the capital. They are supposed to amount in all to about 2000 infantry and 300 cavalry; though it is said that the cavalry, scattered in small detachments through the districts adjoining to the capital, amount to 2000. The infantry are armed with muskets and sabres, and are not uniformly clothed; the cavalry seldom use any other weapon than a spear, about seven or eight feet long. When an army is to be raised, government issues a mandate

Birman Empire, Birmingham.

to all the viceroys of provinces, and governors of districts, requiring a certain number of men to be at a general rendezvous on an appointed day; the levy is proportioned to the population of the province or district, according to the number of the registered houses that it contains; the provincial court determines the burden which each house is to bear; and a certain number of houses furnish a recruit among them, or pay 300 tackal, which is about £40 or £45. The families of their conscripts are carefully retained in their districts as hostages for the good conduct of their relation. In case of desertion or treachery, the innocent wife and parent of the guilty person are dragged to execution without pity; even cowardice subjects the family of the delinquent to capital punishment, a law which, however barbarous, is rigorously executed.

War boats. But the most respectable part of the Birman military force, is the establishment of war boats. These carry from 50 to 60 rowers, who use short oars that work on a spindle. The prow is solid, and is a flat surface, on which, when they go to war, a piece of ordnance is mounted; a six, a nine, or even a twelve pounder, and several are frequently fixed on the stern. Each rower is provided with a sword and lance, which are placed by his side while he plies the oars. Besides the boatmen, there are usually 30 soldiers on board, who are armed with muskets. Their attack is extremely impetuous; they advance with great rapidity, and sing a war song at once to encourage their people, daunt their adversaries, and regulate the strokes of their oars. They generally endeavour to grapple, and when that is effected, the action becomes very severe. The largest of these war boats is from 80 to 100 feet long, and they draw only about three feet of water.

Revenues. The revenue of the Birman empire arises from one-tenth of all the native produce, and of all foreign goods imported into the country. However, as grants to princes of the blood and provincial governors are made in provinces, cities, villages, and farms, the rent of which they collect on their own account, and as in consequence of this money, is seldom disbursed from the royal treasuries, the Birman sovereign must possess immense riches. See Symes' *Embassy to Ava*, 3 vols. *Asiatic Researches*, vol. v. p. 111. 143—156, 219—240; vol. vi. 127—136, 163—308. *Baptist Periodical Accounts*, vol. iii. p. 342, 343. Pinkerton's *Geography*, vol. ii. (W. B.)

BIRMINGHAM, a market town in the hundred of Hemlingford, and in the county of Warwick, is 116 miles from London by Oxford, and 109 by Coventry. It is about two miles in length, pleasantly situated on the side of a hill by the river Rea; and the soil, on which it is founded, consists chiefly of a dry reddish sand. It is remarkably free from damp; and even its cellars are described as comfortable habitations. Its air is naturally exceedingly pure; and, notwithstanding its close population, continual smoke, and noxious metallic effluvia, it is accounted by Dr Price one of the healthiest towns in England. From the register of burials, in an average of six years ending in 1801, while the scale of mortality in London was as 1 to 31, and in Manchester as 1 to 37, that of Birmingham was only as 1 to 59. Instances of longevity among its inhabitants are strikingly numer
and every mean is employed for the preservatio
health, particularly bathing, for which the most
plete and extensive accommodation in the king
has been provided.

The antiquity of Birmingham is argued from
circumstance of its being contiguous to two R
roads, the Ilkenild and Shirley streets; and it is
posed to have existed as a town in the reign of
Alfred. It appears, at least, upon record, th
1251, William de Birmingham, lord of the m
procured an additional charter from Edward II
viving and granting several privileges. It wa
sieged by Prince Rupert in 1643; and, being
after a short resistance, was commanded to be
to the ground; but, by some favourable circums
the conflagration was confined to a few hou
Bull street. It suffered very severely from the p
in 1665; and after the church-yard was filled
the dead bodies, they were interred in an acre o
at Lady Wood green, which, from this circums
has received the name of Pest-ground. It had a
ed some degree of eminence previous to the rei
Charles II.; but it is from this period, that its
increase must be dated. About the year 1700
not contain above 30 streets, but now they am
nearly to 250. Its amazing progress may be re
ed more apparent by the following statements.
1779, there were only three houses between the
to Wolverhampton and Dudley; in 1780, the
creased to 55; in 1781, to 144; and, in 1791,
was an addition of 833. In 1688, the sum disb
for the relief of the poor amounted to £308,17s.
but, in 1787, it was £12,429, 9s. 11¼d.

The lower part of the town consists chiefly o
buildings, is filled with workshops and wareho
and is inhabited principally by manufacturers.
most every artist has a separate house, so that th
pulation is spread over a great extent of surface,
free from many of the evils, which prevail in t
great towns where the habitations are larger, an
veral families crowded into one floor. The u
part of the town has a very superior appea
consisting of new and regular streets, and contai
a number of elegant buildings. There are two
rish churches; St Martin's, with a lofty spire, u
ly denominated the old church, and situated in
lower part of the town, built originally of
about the year 1300, cased with brick in 1690,
repaired, in 1786, at an expense of £4000: and
Philip's, or the new church, which is a very hand
structure, founded in the year 1711, built in a l
elegant style, and capable of containing more
2000 persons. It has a square tower adorned wi
cupola, a peal of ten bells, and a clock with
chimes. There are also four chapels in connec
with the church of England; St Bartholome
erected in 1749; St Mary's, in 1774; St Paul's
1779; and the house of Dr Ash, a celebrated ph
cian in Birmingham, which was converted into an
gant chapel by a private gentleman, at his own
pense, in 1789. There is a number of dissenti
places of worship: two presbyterian meeting-hou
and a third in contemplation; three of independen
three of baptists, several of the methodists, or

a Romish chapel, and a Jewish syna-

gham is distinguished by a variety of chari-
owments. The free school, a very ancient
ı, but the present building, a large and hand-
ce, with a neat tower in the centre, and a
Edward VI. in front, was erected in 1707;
coat school, established in 1724, which re-
) boys, and 40 girls; the dissenters charity
to which 40 boys and 20 girls are admitted;
ıouse, founded in 1733, which possesses a
f £17,000, raised from the inhabitants by
ıent of 6d. in the pound, and which affords
'000 persons; the general hospital, erected
supported by voluntary contributions and
;e bequests, which possesses an income of
ı000 per annum, and which, upon an ave-
ɔmmodates upwards of 70 patients weekly.
; the public institutions of Birmingham may
ɔned the libraries, the first of which was
in 1779, containing about 10,000 volumes,
ɔrted by more than 500 subscribers; a mu-
Jew street, the property of Mr J. Bisset,
:h a variety of natural and artificial curiosi-
bathing accommodations at Lady Well,
seven marble baths, provided at all times
or cold water, and particularly one appro-
ɔr swimming, 36 yards by 18, situated in
: of a garden, furnished with 24 recesses for
ʒ, and the whole surrounded with a high
new theatre, built at an expense of £14,000,
of which is of hewn stone, and to which a
d assembly-room are annexed; Duddeston
ɔr Vauxhall, disposed upon a principle simi-
se of London, for music and other entertain-
ıd the barracks, which occupy five acres of
l by government at one penny per yard, and
:ommodate 162 men.
gham was never incorporated, and possesses
red privileges; but, in consequence of this
nce, the industry of the place is not disturb-
:tion politics, and its magistrates, though
ny borough influence, are not inferior in re-
:y to those of any city in the kingdom.
chosen annually; and consist of a high
ıo inspects weights and measures; a low
.o summons juries, and chuses the other offi-
constables, and one head borough; two
rs, who examine the quality of the beer;
ısters, who inspect the meat exposed to sale;
ɛather sellers, whose offices are now merely
A court of requests, established by act of
t in 1752, and consisting of 72 commission-
of whom make a quorum, meets every Fri-
ng; and the clerks, who attend to give ju-
ıtance, are always practitioners of the com-

: most prominent feature in the town of Bir-
and the most deserving of particular notice
escription of the place, is the amazing va-
:nt, and excellence of its hardware produc-
may safely be pronounced to be the princi-
acturing town in the world; and stands un-
the superior quality and cheapness of its
ies. The principal manufacture carried on by the people of Birmingham, in the earliest periods of its history, was the tanning of leather, and it continued for nearly 700 years to be a noted market for that article; but, towards the end of the last century, this branch of trade was so completely abandoned, that in 1795 there is said to have been only one tanner in the place. Before the Revolution, its other manufactures were confined to coarse iron wares; but the skill of its artists was brought into greater notice and exertion by the following circumstance. William III. having expressed his regret, that it should be necessary to import fire arms from foreign countries, Sir Richard Newdigate, member of Parliament for Warwickshire, engaged, on the part of his constituents, to supply the demands of government; and an order, which was sent to Birmingham, having been speedily and satisfactorily executed, it has continued from that period to furnish the greatest proportion of muskets, swords, and other small arms. The button and buckle trade next became the most extensive; and, in one shop, the former article has been known to be manufactured to the value of £800 per week. Within the last century, every species of steel manufacture has been produced in the utmost abundance and perfection; and a very large street has received the name of Steelhouse lane, from the extensive works of this kind which it contains. There is a considerable whip manufactory and type foundery, and three extensive breweries of ale and porter.

Of late years, very great additions have been made to its trade and manufactures; and there would be no end to an enumeration of its multifarious productions. Among the principal articles, however, may be mentioned an immense variety of buttons, buckles, and snuff boxes; toys, trinkets, and jewellery; polished steel watch chains, cork screws, &c.; plated goods for the dining and tea table; japanned and enamelled articles; brass works of every description; swords and fire arms; medals, and coins of various sizes and metals; copying machines and pneumatic apparatus's; the more ponderous productions of the casting furnace and rolling mill; and, in short, every hardware commodity that can be considered as curious, useful, or ornamental. The manufactories established here for all these different articles are conducted upon the largest scale, and with the most astonishing ingenuity; but by far the most remarkable and extensive is that at Soho, above two miles from Birmingham, the property of Messrs Boulton and Watt, which deserves a more particular description than can be admitted in this place, and for which our readers are referred to the article SOHO.

Among the various concurring causes, which have contributed to the extraordinary progress and prosperity of Birmingham, may be mentioned, its convenient situation, almost in the centre of England; its proximity to the coal mines; its want of corporate restrictions; its freedom from election canvassings; and, particularly, its extensive canal communications. Formerly, its various and valuable goods were sent chiefly to London by land carriage, and supplied the foreign markets only through the medium of merchants in the metropolis; but now the principal orders for foreign supply come directly to mercantile houses in the town of Birmingham itself, and, by means of its improved inland navigations, its heaviest products are conveyed to the remotest distance without any considerable addition to their original price. By the old canal, which was cut in 1768 and 1769, are conveyed to this place various raw materials, and particularly the important article of fuel from the Wednesbury collieries. This cut was, in 1772, extended to Autherby, and thence to the Severn, by which there is a communication with Shrewsbury, Gloucester, and Bristol. In another direction it joins the Trent, and thus opens a conveyance to Gainsborough, Hull, and London. From this canal there is likewise a junction with the grand line of canal, which runs along the pottery in Staffordshire, thence extending to Manchester and Liverpool. By the new, or Birmingham and Fazely canal, there is a communication to Fisherwick, Tamworth, Polesworth, Atherstone, Nuneaton, Coventry, Oxford, and thence, by the canal or the Thames, to London. Thus the produce of its manufactories are easily dispersed throughout the kingdom, and conveyed entirely by water carriage to the principal sea ports of the North Sea, the British Ocean, the Irish Sea, and St George's Channel. But, though the flourishing manufactures of Birmingham have filled the town and its vicinity with a multitude of ingenious and industrious inhabitants, all usefully employed in their own support, and in the service of the community, yet it must be admitted, that much ignorance, profligacy, drunkenness, and discontent prevails among the labouring classes, and that these have, on several occasions, exhibited a strong disposition to rioting and tumult. This was remarkably manifested in the year 1791, about the commencement of the revolution in France, when the most disorderly proceedings were carried on during several successive days, and property to the amount of £60,000 was plundered or destroyed.

In 1801, the town of Birmingham contained 16,403 houses, of which 1875 were uninhabited; and its whole population amounted to 73,670, of whom 62,702 were employed in trade and manufactures. See Hutton's *History of Birmingham*. (*q*)

BIRR, or PARSONS TOWN, the name of a post and market town in King's county, Ireland, situated on the river Little Brosna. It carries on a considerable manufacture of cloth and serges, and has also several breweries, distilleries, and malthouses. See Coote's *Survey of King's County*. (*j*)

BIRSE, the name of a river in Switzerland, famous for the desperate battle fought near it in 1447, when the French triumphed by the force of numbers, over the matchless heroism of the Swiss. An account of this battle will be found in Coxe's *Travels in Switzerland*, letter 17. vol. i. p. 177. See also SWITZERLAND. (*w*)

BIRTH. See MIDWIFERY.

BISCARA, or BISCARIS, or BASCARA, a town in the kingdom of Algiers, originally built by the Romans, and afterwards destroyed by the Arabs, by whom it was since rebuilt. Its paltry castle, defended by six pieces of ordnance, is the seat of a Turkish garrison. The numbers of scorpions and poisonous reptiles that infest the houses, drive the inhabitants from the town during summer. The highest class of the inhabitants carry on a little trade in negroes and ostrich feathers, while the lower orders emigrate to Algiers, to seek for subsistence from the most menial occupations in that metropolis. They are held in great estimation for their honesty and kindness; and when they have amassed a little money, they return to Biscara, where they are reckoned among the wealthy of that place. E. Long. 5° 15′, N. Lat. 34° 30′. (*o*)

BISCAY. Part of the Spanish monarchy, including three cantons, Alaba or Alava, Guipuzcoa, and Biscay Proper, constitute a province called the Lordship of Biscay. This province is bounded by the Bay of Biscay, and the Gulf of Gascony, on the north; on the east, by Navarre; on the south, by Old Castile; and on the west, by the same kingdom and the Asturias. The country consists entirely of hills and mountains, many of which are piled on each other to a great height: the ascent of the mountain Gorveya occupies five hours; but on the summit is a beautiful plain, whither the herds of Biscay Proper and Alava are sent to pasture during several months of the year: some of the hills are cultivated to the top; and the vallies dividing them being devoted to agriculture also, and the pasture of flocks, the inhabitants suffer few of the inconveniences attached to a mountainous country.

Different species of iron ore are found in the mountains of Biscay; the richest is near Hernani in Guipuzcoa; in the vicinity of Bilboa the chief town, where the ore reaches the surface of the earth, and at Somorrostro likewise in Biscay Proper. The [illegible] consists of a regular undulated hill, which may be encompassed in walking during four or five hours and here the ore forms an uninterrupted stratum from three to ten feet in thickness, covered with a bed of whitish calcareous rock from two to six feet thick. When first taken from the mine, the ore is of the colour of bull's blood, and exhibits a purple tinge on being wet. It is reputed the softest and most fusible iron ore of all Europe, and is said to be frequently mixed with what yields a harder metal in smelting, by those who carry it to a distance from the mine. To reduce the ore to a malleable state, it is first roasted by alternate strata of wood and ore piled together being set on fire; next it is put into a furnace, and after having been in a state of fusion, it is placed on an anvil, under an immense hammer of 700 or 1000 pounds weight, by which the mass is squared and reduced to bars. Thus the ore is said to be fused in a few hours, the bars formed, and sold to blacksmiths. A quintal of ore will afford thirty-five pounds of good iron. The mine of Somorrostro has been worked during many centuries; and the workmen employed in it, from frequently finding broken pieces of implements that had been used to dig it out in ancient times, maintain that the ore is renewed. Besides the mine of Somorrostro, there is a great ferruginous rock, about half a mile from Bilboa, which is of a different nature. An engineer engaged in some public works near this rock, found a vein of ore eighty feet from the surface, consisting of an infinite variety of ramifications, some an inch in diameter, and others as thick as the arm. Hæmatites or blood-stones, are often found in the mines of Biscay,

yield twice or thrice as much iron in propor-
comes from the ore of Somorrostro, but hard
ittle. About a league from the town of Mon-
, in Guipuzcoa, is the iron mine of Mondra-
he ore of which affords about forty per cent.
al. It is of difficult fusion, and is said to con-
tural steel. Tradition affirms, that the famous
o sword-blades were made of the iron of Mon-
, and that they were tempered only during
. Others insist that they were fabricated of
re steel found there, to which some iron was
in the middle of the blade, to render it more
e: It is likewise reported, that the name *Pedro*
garetea of Bilboa proves that a blade is ge-
Copper and marble are found in Biscay. A
ring near the village of Aguana produces a
quantity of salt, which is extracted by boiling
aporation: and there are various mineral wa-
both hot and cold, in all the three cantons;
h their constituent principles, from never ha-
een analysed, are unknown. Near the village
dio, between Bilboa and Orduna, is a well, ap-
tly communicating with the sea, which is seven
s distant. When the tide flows, the water in
ell rises, and as it ebbs, it falls. Besides this
lical rise, the well becomes still fuller, and even
ows in a storm, when it crosses a neighbouring
and is hot and soapy.

e mountains of Biscay are beautiful and pictu-
; many of them are covered with trees and
of natural growth, such as the oak, straw-
and currant, indigenous to the climate; and
habitants of the province have contributed to
them still more woody, by the plantation of
rees, and those which afford useful timber. The
se waste of fuel in the iron works of the pro-
render this a necessary precaution; and, were
for the constant renewal of wood, the moun-
would in a few years be stripped bare.

d boars still exist in the woods of Biscay, and
have been killed in their immediate vicinity.
s sometimes appear, and foxes are extremely
s to the animals they can overpower.

e species of birds of passage annually enter
from Africa, when the heat of the season forces
o change their abode. Those called *chimbos*,
failure of fruit, by being burnt up, and of
heir principal sustenance retreating from the
ing rays of the sun, cross the Straits, and enter-
dalusia, distribute themselves in flocks over all
The chimbos breed in Andalusia and the Sierra
a, and remain there among the copses, which
articularly inhabit, feeding on fruit and ants;
hen these fail, they take a rapid flight over the
of La Mancha, and arrive in Biscay during
st, where great numbers are caught and brought
public markets. Though lean, feeble, and ex-
d with the length of flight, in the space of
ays they become as fat as ortolaus or beccafi-
The chimbos again shift their abode, when the
nal rains occasion the failure of their necessary
and then they disappear in a single night. An
ce is related of a great multitude of them ha-
collected on the 27th of September, when a
breeze sprung up, and next day not one was to
be seen: they disappeared as if anticipating heavy rains, which began to fall on the 29th. The chimbos are succeeded by wood-cocks, which breed among the rocks on the north parts of the mountain Gorveya.

The population of Biscay is limited in proportion to the extent of territory, for the whole lordship does not contain above 300,000 souls. According to the royal census in 1787, 1788, the population was 310,758, of which 116,042 belonged to Biscay Proper; but from a more recent enumeration in 1800, the population, even including a district which is generally esteemed without its confines, had decreased 20,000. One portion of the population was divided into 2084 priests, 2043 monks and nuns, 116,923 nobles, 471 persons in the law department, 455 students, and 8731 servants.

The territory contains 720 parishes, in which are 158 religious houses, 4 cities, 176 towns, and 446 villages. The chief towns are, Bilbao in Biscay Proper, Vittoria in Alava, and St Sebastian in Guipuzcoa. The first is situated on the banks of the river Ybaizabal, about two leagues from the sea; and being a port, which in former days was proverbially the terror of British seamen, carries on a considerable trade. This would be greatly increased, were it not for injudicious regulations, by which it is rather discouraged than otherwise. Owing to the inhabitants resisting the introduction of customhouses among them, they are deprived of free commerce with America; and whoever wishes to engage in an adventure thither, must prepare it in another port beyond the province. The settlement of strangers in the town is likewise subject to difficulties; for, to obtain the freedom of it, one must prove that he is not descended from a Moor or a Jew; that he is sprung of a noble family; at least that he has not exercised any mean or mechanic art. Commissioners are actually charged with investigating these particulars; a proceeding so repulsive to the encouragement of liberal traffic, that it can excite no surprise if it should never flourish. An uncommon degree of dampness prevails in Bilbao, by which iron is covered with rust; furniture, even in the upper apartments, injured; the salt extracted out of dried fish; and, as some suppose, the multiplication of destructive insects promoted. Yet few diseases prevail, and the inhabitants enjoy health and strength, a cheerful disposition, and longevity. It has thence been asked, "Why should Bilbao, built on the side of a river, in such a damp situation, and chiefly on piles, like the cities in Holland, be so remarkably healthy, when every thing should conspire to render it the reverse?" The solution of the difficulty has been traced to the constant breezes, which prevent any accumulation of vapour, and that stagnation of it which is pestiferous to animated existence. During four months that Don Guillermo Bowles resided there, only nine persons were buried, four of whom were above eighty. Vittoria, which is situated on the declivity of a hill, contains 6000 or 7000 inhabitants; its population is said to have been anciently 18,000. Here there is a royal asylum for 150 persons, and six monasteries and nunneries. St Sebastian lies on a peninsula, flanked with batteries, and protected by a castle on a naked circular hill; but;

Biscay. notwithstanding the appearance of strength, it could not make a protracted resistance. Owing to this town being a sea port, and carrying on some trade, the population rises to 13,000 souls. Most of the other towns in Biscay are inconsiderable. Fontarabia, on the extreme limits of Spain, was formerly esteemed one of the keys to the kingdom, and once stood a siege by the French.

The Biscayans convert the vallies, and the less rugged parts of their mountains, to the greatest agricultural use of which they are susceptible. But the farmer has to contend with a stubborn soil, which only by the unsparing use of manure affords him an abundant harvest. For centuries the fields have been plentifully supplied with lime, yet little alteration in many instances follows; and, were it not for extraordinary exertion, nothing except brush-wood and briars would spring. The mode of turning up the earth, which is detailed by the acute and intelligent Bowles, is extremely rude and laborious. An iron-pronged instrument is forced into the ground by the united power of three or four persons, and large pieces of turf turned over by mere manual power. These are afterwards broken in pieces, and the clods beaten with wooden mallets: holes are dug, and the grain sown in them. The steepness of the mountains, added to the stubbornness of the soil, is a great obstacle to agriculture, insomuch, that the consumption of the lordship exceeds its produce; and the income from land, deducting all charges, amounts to no more than two *per cent*. There is abundance of good fruit in Biscay, and wine is made for home consumption. An indifferent kind, called Chacoli, is procured from a mixture of grapes, and until it is consumed, no other kind can be sold by the vintners. The proprietors being thus secure of a market, become regardless of its quality, and it is carelessly made; it serves, however, only during four months of the year, and the remainder of what is required for the lordship comes from Old Castile. Vineyards are numerous about Bilbao and Osduna, forming the principal revenues of the gentlemen.

The number of iron mines in Biscay has led to the establishment of extensive manufactories, particularly as the ore may be procured at a trifling expense. The mine of Somorrostro is free to the whole inhabitants; it is common property, and each may carry away as much as he pleases. Great quantities are conveyed from it by water-carriage; and calculations have been made, that it does not yield less than 300,000 quintals annually. There are manufactories of anchors, cannon, and other fire arms, in different parts of the province. Copper boilers of large dimensions are fabricated at Toledo one of the chief towns of Guipuzcoa, and sheets of sheathing copper prepared at Balmuseda. Extensive manufactories of cordage and rigging are likewise established at St Sebastian and Bilbao.

The only natural productions with which Biscay can supply other countries, are iron and chesnuts. Notwithstanding the abundance of the former, the profits to the proprietors are extremely inconsiderable. A well managed forge does not produce above 500 ducats, each worth 4s. 8d. to its owner; and the returns of some, after paying all expenses, scarcely amount to 300. Yet this is the chief article whic brings money into Biscay. But the inhabitants a obliged to be economical of fuel, and to use sma forges. Were these as large as some which are en ployed in the great iron works in other parts of E rope, the mountains would be stripped bare of woo and the works interrupted for want of fuel. Th preservation of ancient privileges checks the trade Biscay; for Bilbao, owing to the rejection of custo houses, receives no encouragement from governme A commercial company, established at St Sebasti in 1728, proved of great utility to the province Spain immediately supplied all Europe with coco at a period when tea was only beginning to be know and it quickly fell two-thirds in price. Subseque mismanagement, and the contraction of a great load debt, occasioned the dissolution of the company i 1780; but, until the present war, a private trade wi America was still carried on by the merchants of S Sebastian. The intercourse of the province withi its own limits, and also with other parts of Spai is greatly facilitated by excellent roads, thoug there is a great want of inns. Formerly the road passed over mountains, or along the edge of pr cipices, and, in consequence of the inconvenienc attending them, the three cantons united to form ne ones at the public expense.

A society was established a considerable time ago called the *Sociedad Bascongada*, or Biscay Societ partly, we believe, with the view of philosophical improvements; but there are here no extensive seminaries of literature. A school was established on a liberal plan at Vergara, in Guipuzcoa, solely at the expense of a patriotic society, where various branches of useful study were taught. There are sixteen masters, who, in addition to the more ordinary parts of education, teach the French and English languages, drawing, and music. The institution is under the superintendance of commissioners, who are changed every four months; and one of them constantly resides in the edifice devoted to its purposes. Every four months, also, the pupils undergo a public examination in presence of the commissioners, and prizes are annually bestowed on the most meritorious. Naval schools have been established in Biscay, an schools for drawing at Vittoria.

Biscay can boast of few learned men. Larrea, celebrated lawyer, who flourished in the seventeen century, was born at Vittoria; and in that precedin it, Diego Esquivel wrote a work on the reformati of religion, which is said to contain many excelle principles, though esteemed too difficult to be co verted to practice. The language of the province distinct from that spoken in the rest of the Spani dominions, and its use remounts to a high period antiquity. It is said to be soft, harmonious, a energetic, and so peculiar to the inhabitants, th Larramendi wrote a book called *El imposible v cido; arte de la langua Basconada:* and the co mon Spanish dialect is not understood in the mou tains.

The Biscayans possess an inherent love of liberty, which nothing can prompt them to forego; the jealously preserve various privileges, which they e ther enjoyed while an independent government, o

:er becoming a province of Spain. Their
instead of being duties imposed by the
sist of voluntary contributions advanced
abitants themselves. No stamped paper,
e great source of revenue, is received in
p; and some articles, such as tobacco,
·lsewhere the subject of royal monopoly,
the traffic of each individual. Biscay is
to the impress of seamen; it is exempt
hing any quota in a levy of militia; nor
be quartered in the province. Whatever
ts defence during war, or the preservation
.ity in the time of peace, belongs to the
exclusively. The Biscayans being all
a distinguished rank in the rest of Spain;
ting to the grand judge of Biscay, who
bunal in Valladolid, they are accountable
ıer beyond the confines of their lordship.
l their privileges, is that which is guarded
est jealousy. Their laws and privileges
nove them from the conditions of most
cts of the kingdom; for their affairs are
by a general assembly of representatives,
onvoked every two years. These repre-
neet under the tree of Guernica, a vene-
which has resisted the elements for centu-
.her Ferdinand and Isabella repaired, after
in 1476, and swore to preserve the privi-
: Biscayans entire. When the king raises
:ey are bound to march, at their own ex-
nother tree, called Malato, on their con-
having passed it, they are entitled to re-

cayans preserve a decided difference of cha-
n the other Spaniards. They are of a
vely disposition, friendly, and hospitable.
faithful, active, and industrious; but as
terbalance these good qualities, they are
ostinate, irritable, and impatient. Here
ı are equally active as the men: they par-
the most laborious employments, such as
the fields, rowing boats, and carrying bur-
ir heads, which require the strength of two
t up. "The wife yields not in strength
band, nor the sister to the brother;" and
in sports elsewhere peculiar to men,
nis, in which they show themselves their
·ivals. The people in general are patient
in good and bad weather, they travel to
le distance to attend their parish churches,
ıich are very far asunder. The inhabitants
coa are fond of bull-fighting, with which
's celebrate the festivals of their tutelar
thither the inhabitants of the neighbour-
ı resort to enjoy the barbarous entertain-
ıe bulls of Spain are said to be more fero-
better adapted for being pitched against
than those brought from abroad; which
:ribes solely to the influence of climate.
ere is some foundation for his opinion; for
able, that all animated nature is deeply af-
he influence of climate, and much of the
d customs of the whole human race may
ced to its effects. It is well known, that
the same species are less ferocious in one region than another, and that under the same degrees of latitude incipient customs arise nearly at the same stage of civilization among nations. The universal privilege of nobility produces a principle of dignity among all the Biscayans from the highest to the lowest, and on proving that they originally belonged to the lordship, or come in lineal descent from those who did, they are entitled to claim public certificates of being gentlemen by blood. The three cantons have many ancient seats, consisting of strong plain edifices with square towers, which have existed from time immemorial. The owners of these are distinguished by the title of *Hidalgos de Casa Solar*, or gentlemen of known property, the most honourable appellation in Spain. The head of the family is called *Pariente Mayor*, and is greatly respected by all the collateral branches. The origin of such *Casas Solares* is thought to have been anterior to the establishment of Christianity in Spain, and before the use of archives or armorial bearings was known. But some of the owners are now so much reduced, as to be under the necessity of cultivating their estates with their own hands, while the branches which have come off their families flourish in opulence in remote provinces. Simplicity of manners is one striking characteristic of the Biscayans: the wives and daughters of the most wealthy do not disdain useful occupations in their domestic economy. Unlike the arrogance of many European states, a proverb is current here, which marks the liberality of the people, *la pobreza no es vileza*, poverty is no blemish. Extreme gaiety prevails throughout the lordship of Biscay; the inhabitants are passionately fond of dancing, and on holidays a vast concourse assembles to dance under the trees to the music of a rustic pipe and tabor. Children who die young, are preceded to the grave by musicians; the body is crowned with roses, and the followers tumultuously proclaim their joy at the blessed transition. The same origin has been ascribed to the Biscayans and the Irish, which opinion Guillermo Bowles, who himself sprung of an Irish family, supposes is corroborated by the similarity of customs still practised among them. The men and women of Biscay are extremely fond of pilgrimages. Collecting in troops, they journey from great distances to the churches of their tutelar saints, singing and dancing by the way to the sound of the tabor. The Irish do the same at the festivals of their patrons. The *Guizones* of Biscay, or the *Boulam keighs* of Ireland, are similar, from the sudden and dangerous quarrels that arise and terminate without any remaining rancour, and without a deadly weapon being drawn. The people of both countries are extremely choleric; the least occurrence irritates them, and they cannot endure the most trifling slight. The *Chacoli* of Biscay, and the *Shebeen* of Ireland, render them equally frantic, and greatly to be dreaded. The poor people in Ireland, as in Biscay, eat from the same dish without forks, and using their fingers; and they dwell in the midst of smoke. The ancient brogues are the shoes of Biscay, "and the women here, as in Ireland, wrap a *sabanilla* or *kerchief* round the head, wear red petticoats, frequently go barefooted, carry weights on their heads, and labour along with the men. These, and other concurring circumstances, afford strong

Biscay.

Biscay,
Biscuit-
Making.

presumptions that the natives of the two countries have had one common origin."

The modern Biscayans consider themselves descended from the ancient Cantabri, who offered the most determined resistance to the Roman arms, and who were distinguished by the same energetic character which marks their posterity.

> *Cantaber ante omnes hyemisque, æstusque, famisque,*
> *Invictus palmamque ex omni ferre labore*
> * * * * * * * * *
> *Nec vitam sine marte pati; quippe omnis in armis*
> *Lucis caussa sita et damnatum vivere paci.*
> Silius Italicus.

The Cantabrians having sought the alliance of the Gallicians and Asturians, ventured to engage the Roman army on the plain of Vittoria, where they were totally defeated, and driven to their mountains.

> *Cantaber, Agrippæ, Claudi virtute Neronis*
> *Armenius cecidit.*
> Horace.

The Romans finding themselves unable to conquer the Cantabrians by force, endeavoured to subdue them by famine, and so completely environed their retreats, that they were reduced to the utmost extremities. Then, it is reported, that, to avoid the slavery destined for them by their invaders, most of these brave people committed suicide; and Augustus having entered Biscay, partitioned it among his soldiers. Nevertheless, hostilities were frequently renewed by the survivors, until at length the Romans, in the uncertainty of human affairs, were, in their turn, over-run by the irruptions of barbarous nations. Biscay was in the next place conquered by the Moors: though not without a resistance equally resolute as that which had been offered to the arms of the Romans. After a revolt in the tenth century, we find it governed by a chief called Suria or Zuria, who, tradition says, was descended from the royal blood of Scotland. He constituted the province into an independent lordship, the sovereignty of which was enjoyed by his posterity, until subsequent revolutions followed, and at length ended in the lord of Biscay acknowledging the dominion of the king of Castile. In the fourteenth century, Peter the Cruel, king of Castile and Leon, killed the lord of Biscay, usurped his possessions, and united them to his own; and since that period the kings of Spain have assumed the title of Lord of Biscay, which is still retained. (*c*)

BISCUIT-Making. As the process of making biscuits for the navy is rather curious, we shall endeavour to lay before our readers a very short account of it. After the meal and water are combined into large lumps of dough, it is kneaded by means of a machine, which consists of a roller, about six inches in diameter, and seven feet long. One of its extremities is fixed into the wall, so as to have a certain degree of play, while a man rides, as it were, on its other end. The lump of dough is then placed below it, and the man puts the roller into action, till the dough is sufficiently kneaded. In this state it is given to a second workman, who slices it with a large knife, for the use of the bakers who attend the oven. The rest of the process is effected by four workmen, two of whom take their station, each at the end of a large table that holds the dough; third stands at a small table near the oven; fourth stands at the oven, and the fifth supplies peel. The dough is then moulded into someth like muffins by the person on the farther side of larger table. He then throws them to the man the other end of the table, who puts the pro stamp upon them, and throws them upon the sm table, where the third workman separates the diff ent pieces into two, and places them under the ha of the fourth baker, who throws the bread upon t peel. The fifth workman receives the biscuits on t peel, and arranges them in the oven. All these su cessive operations are performed with such activi and exactness, that seventy biscuits are thrown during a single minute. It is evident, that the bi cuit first thrown into the oven would be baked soo er than the others; but this effect is obviated by th workmen who moulds the dough, and who propo tionally diminishes the size of the biscuits; so th those which are last thrown in require less heat tha the others. The biscuits thus made are placed i drying lofts above the oven, and are afterward packed into bags, of one hundred weight each, an removed to the warehouses. (*j*)

BISCUTELLA, a genus of plants of the clas Tetradynamia, and order Siliculosa. See Botany. (*w*)

BISERRULA, a genus of plants of the clas Diadelphia, and order Decandria. See Botany. (*w*)

BISERTA, a maritime town of Africa, in th kingdom of Tunis, situated at the bottom of the an cient Sinus Hipponensis, a beautiful gulf about fo leagues in breadth. This town, which is still abou a mile in circuit, was formerly very large, and con tained about 6000 houses. It lies on a canal, whic joins a large lake with the gulf already mentioned and is defended by several castles towards the sea, an two towers which guard the entrance to the harbour There are here two spacious prisons for holding slaves, and a large magazine for articles of merchan dise. The remains of a long pier are still visible and were it not for the inactivity of the Turks, i might be easily repaired, so as to preserve the harbour from becoming altogether useless. The inhabitants, who are chiefly employed in fishing betwee the months of October and May, obtain a great va riety of fish from the lake. The millets are deeme the best in this part of Africa; and their roes, whe dried, are made into *botargo*, which is exported a dainty to the Levant. The surrounding countr abounds with fruit of all kinds, with cotton, corn pulse, oil, &c. Population about 5000. E. Long 9° 48′, N. Lat. 37° 10′. (H)

BISHOP, a prelate, holding a barony of th king, and exercising ecclesiastical jurisdiction over certain district called his diocese.

The term bishop is derived from ἐπισκοπος, throug the medium of the Saxon "bischop," and denotes a inspector, guardian, or overseer. In the dead lan guages, however, the word now commonly trans lated bishop, was originally used with a civil or poli tical meaning attached to it, as, when Plutarch says, *Πάνlα διειπε και πανlων ἐπισκοπος ην ἀυτῳ Φειδιας, om nia ipsi administrabat et curabat Phidias*, or whe

called *episcopus oræ et Campaniæ*; but, af-
ntroduction of Christianity, it came exclu-
denote an ecclesiastical ruler. It is of
this last sense only, that the Greek or La-
is synonymous with the English "bishop."
interpretation given above, it is evident, that
tor, guardian, or overseer, may be considered
relation to one church or assembly of Chris-
mmitted to his care, or to a number of
. The former in the notion of the Presby-
nd Congregationalists of all descriptions:
that of the Episcopalians and Roman Ca-
And, as far as the meaning of the word is
d, there appears to be no doubt, that either
be included under it.

ot to be questioned, that, in the early ages
ianity, mention is distinctly made of an ec-
l officer, bearing rule not over a single
nly, but over many churches; which officer
refore have been a diocesan or bishop. This
l by the keenest advocates for presbytery;
deny that such an officer, residing in one
confining his labours to a particular district
e, existed in the church during the aposto-
and regard the introduction of such an of-
culpable deviation from the primitive mo-
re the parties are exactly at issue. It be-
to us to attach ourselves to either side,
r suppressing our own opinion, to give, as
historians, a short view of the arguments
the Presbyterians, on the one hand, and
opalians on the other, have defended their
opinions: disclaiming that intolerable bi-
hich would make a devotion to our own
to those of the hierarchy, the exclusive
of future happiness.

eat object of the Presbyterians is to esta-
quality among the teachers of religion, un-
nction of apostolical example, and the con-
the primitive church. With this view, they
hat, among the apostles themselves, whe-
idered as ordinary or extraordinary func-
the equality for which they contend may
ised. To none of these eminent persons
given any jurisdiction or inspection over
corresponding to that of a modern bishop
hop; not even to Peter, for, though the
in one place declared to be founded *on him*,
ame church is elsewhere said to be built
foundation of the apostles and prophets"
Jesus Christ himself being the chief cor-
Upon this footing of equality, likewise,
at Paul, in a remarkable instance, so far
ding to the authority of Peter, "with-
to the face," because, in his judgment,
be blamed. Nay, there is upon record a
f Christ, addressed immediately to the
in which he enjoins them to mutual submis-
forbearance. "Whosoever will be chief
u," says he, "let him be your servant,"
. 29. The same observations apply to the
s, in the number of whom are included
imothy, and Titus, as well as Mark and
d also to the seventy disciples; for in
these instances are there any traces of subordination to be discovered. In supporting their leading proposition, the Presbyterians farther maintain, that the terms ἐπίσκοπος, and πρεσβύτερος, are used as synonymous, and convertible in almost every passage of the New Testament where they occur; or, in other words, that the same persons who are called ἐπίσκοποι, are likewise called πρεσβύτεροι, the former expression being the name of office, and the latter the epithet of respect. In proof of this assertion, they adduce the well-known passage in the 20th chapter of the "Acts of the Apostles." In that chapter, we are informed, that Paul, having summoned the elders of the church at Ephesus, τοὺς πρεσβυτέρους τῆς ἐκκλησίας, the presbyters of the church addressed them, that is, the elders or presbyters, in the following words: "Take heed, therefore, to yourselves, and to all the flock over which the Holy Ghost hath made you (the presbyters) ἐπισκόπους, bishops, or overseers." Here (says Dr Campbell) "there can be no question, that the same persons are denominated presbyters and bishops." Nor does this passage by any means stand alone. There is a similar one in the Epistle to Titus, chap. i. ver. 5, compared with verses 6th and 7th. The reader may likewise consult 1 Pet. v. and 2.; but, for our remarks on these passages, as applicable to the present question, as well as for additional observations on the terms πρεσβύτερος and ἐπίσκοπος, we refer to the article PRESBYTERY. We may conclude this paragraph, however, with stating, that, wherever the ordinary ecclesiastical functionaries are mentioned by the inspired writers, it is uniformly under the character either of presbyters (*i. e.* bishops or overseers,) or of deacons. Two classes of functionaries only are spoken of, without the most distant allusion to a third order, that of diocesans; yet, (say the Presbyterians) if this last order had existed, being, according to the Episcopalians, the most important of the whole, it would undoubtedly have been specified and noticed as that importance required. See *the Epistle to the Philip.* chap. i. v. 1. See also the *First Epistle to Timothy*, chap. iii.

The advocates for presbytery next contend, that the bishops or presbyters of the apostolical age, were usually the pastors, each of a single congregation. They say, *usually* the pastors, each of a single congregation, because, as they affirm, there are instances where two or more pastors have been allotted to one Christian assembly; though the converse of this proposition is not true, that there are instances in the age referred to, of two or more congregations subjected to the authority of one bishop. In establishing the proposition enunciated above, it is asserted, that, when Titus, acting in the capacity of an extraordinary minister, was left at Crete, it was, for the following purposes, among others, "that he should ordain presbyters or bishops in every city," Tit. i. 5. Now, from this statement, it is evident, at first sight, that these presbyters or bishops could not be diocesans. Had it been the intention of Paul to establish, by the agency of Titus, a diocesan authority in Crete, we should have found one individual put in possession of that authority, with a college of priests for his assistants. But this was not the case: Titus was left to ordain presbyters or bishops in every city, that is, to furnish the Christians of each city with an ordinary pastor. From the most ancient catalogues and histories, with which we are acquainted, we learn, that there were eleven of these pastors in the island alluded to; a fact obviously incompatible with the Episcopalian hypothesis, unless we can believe, that, in the small island of Crete, and at this early period of the church, there were no fewer than eleven diocesans, each having an array of priests and congregations under his ecclesiastical jurisdiction. The presbyters or bishops, ordained by Paul and Barnabas, (Acts of the Apostles, xiv. 23.) appear likewise to have been the spiritual instructors of individual churches. In short, say the advocates for presbytery, the fact is, as we have stated it, and, taking the inspired writers as the highest and best authority, our antagonists will search in vain for the office of a bishop, according to the modern interpretation of that word, among the functionaries established by the apostles in the Christian churches. This is even allowed by many of the Episcopalians themselves, "*Est sane admodum precaria,*" says Mr Dodwell, "*omnis illa argumentatio, qua colligitur disciplinæ ecclesiasticæ in posterum recipiendæ, rationem omnem e Scripturis Novi Fœderis esse hauriendam. Nullus enim est qui id profitiatur aperte sacri scriptoris locus.*" *Parænesis*, N. 14. Can that, therefore, (the Presbyterians ask,) be an institution of Christ, for which there is no authority in the sacred writings, and which, by the account of the author just quoted, was not in existence before the conclusion of the apostolical period?

We should here introduce a conspectus of the arguments for a government by church-courts, composed of members all possessed of equal authority, together with the criticisms on the word πρεσβυτέριον, as it occurs in sacred scripture; but the limits prescribed for this article, oblige us to refer the reader to another part of our work. See PRESBYTERY.

To the arguments of the Presbyterians, the friends of Episcopacy have not been backward to reply. They contend, that both the name and authority of bishops may be referred to a very early period of the Christian church. They regard the apostles themselves as a college of bishops; and their successors, in the episcopate, as deriving from them their jurisdiction and privileges. They give more weight than the Presbyterians allow, to a tradition, which, they say, prevailed universally in the times immediately succeeding the apostolical period, and from which they consider themselves as entitled to affirm, that James, the son of Alpheus, otherwise called James the Less, and the Lord's brother, was the first bishop of Jerusalem; and, by the same authority, that Peter was the first bishop of Rome. In corroborating this tradition, they quote a passage from Tertullian, an author who lived in the second century, where he challenges the heretics "to exhibit the order of their bishops, so succeeding each other from the beginning, that the first bishop had *for his author and predecessor* some one of the apostles, or of those apostolical men who were their companions in labour;" a challenge which evidently supposes, that the orthodox Christians were able to exhibit such an order: And, accordingly, he goes on to state, that "the church of Smyrna has Polycarp placed there by St John; that the church of Rome has Clem ordained by St Peter; and that the rest of t churches show other persons, who, being placed the bishoprics by the apostles, transmitted the apo tolical seed." (*De Præs. adv. Hæretic.* p. 78 The examples of Timothy and Titus, however, a pear to be more decisive in favour of Episcopacy th that of the apostles. Hence much authority h been ascribed to these examples, considered as a p of the original institute, more especially intended f the direction of succeeding ages. At the same time, must be granted, that no little doubt has been ente tained with respect to the exact nature of the off held by these evangelists. But, while this is gran ed, it is (say the Episcopalians) not to be denie that many things concerning them are abundantl certain. The introduction of Episcopacy seems t have been progressive. Though it be admitted, th there were presbyters or elders of the church, at Ephesus (Acts xx. 17. and 28.) in the year 58, an that these presbyters or elders, are, in a gener sense, denominated bishops, as exercising functio similar to those of the episcopate; and though it b farther admitted, that when these presbyters or elders are spoken of, it is without any allusion to an individual bishop at that time existing among them, yet it must be considered, that this was the early and imperfect state of the Ephesian church. For we are told, that, in the year 64, when Christianity was more advanced, Timothy was established at Ephesus by Paul, to ordain elders, and stop the progres of divisions and schisms; or, in other words, he was settled there with authority, corresponding t that which we now call Episcopal, (1 Tim. i. 3 and iii. 1.) Accordingly, the apostle wrote, in th same year, a letter to Timothy, in which he laid before him the necessary duty of a bishop, as well a the requisite qualifications for that office. The patrons of Episcopacy likewise inquire, "what is i after all, that constitutes the chief difference between our antagonists and us?" And they answe the question: The chief difference consists in this that, with us, the right or power of ordination resides in an individual, while, with them, it belong to a court. Now we contend (say they,) that th former of these is established, and the latter exclude by the instance or case of Titus. He was left i Crete for this especial purpose, that he, not a cour but an individual, might ordain presbyters or elde in every city. And, from the example of Titus, o rather of ordination by an individual, exemplified i him, they denounce the Presbyterians, sometim perhaps with more fury than the argument draw from the case will allow, as unlicensed and darin intruders into the ministry of the New Testament.

Another argument employed by the Episcopalia is taken from the Epistles to the seven Asiat churches, mentioned in the Apocalypse. The epistl alluded to are not addressed either to the church in general, or to any assembly of the rulers in the churches, but to an individual, called in each instan "the angel of the church," (Rev. ii. 1.) "To the angel of the Church of Ephesus, write these things: "To the angel of the Church of Smyrna, say;"—an so in all the other cases. Now, the Episcopalia maintain, that the individuals here denominated th *præmunire*, under which term are implied, outlawry, or exclusion from the king's protection; a forfeiture to the crown of lands and tenements, goods and chattels; and imprisonment during his majesty's pleasure. After the interval of twelve days just alluded to, the king presents, by his letters patent, to the vacant see. The election, or presentation, is next intimated to the archbishop of the province, who is required to proceed without delay in confirming the bishop elect. Should he decline, he likewise incurs a *præmunire*. The mandate, requiring confirmation, bears the authority of the great seal. As soon as it is received by the archbishop, it is transmitted to an officer called his vicar-general. The ceremony of confirmation then takes place. Those, who have any objections to the new bishop, are solemnly invited to appear and substantiate them, and are denounced, as contumacious, if they refûse to do so. The oaths of allegiance and supremacy, together with that of canonical obedience, and that against simony, are next administered. A minute of the proceedings is then read by the vicar-general, after which the bishop is installed or constituted the ecclesiastical superior of his diocese, being fully invested with episcopal authority; though, according to some lawyers, he cannot lay claim to the temporalities of his benefice, unless he shall have been consecrated by the archbishop. The ceremony of consecration differs in some respects from that of confirmation. It must be performed, as we have just intimated, by the archbishop; or, in particular cases, by three bishops, lawfully commissioned for that purpose. The essential parts of this ceremony, according to Burnet, (xxxix. *Art.* p. 564.) are prayer and the imposition of hands; but to these are added, investiture with the episcopal robes, together with the use of a certain form of words adapted to the occasion.

By the law and ordinances of England, all bishops, with the exception of one, the bishop of Sodor and Man, are lords of Parliament, though not peers of the realm. In the reign of William the Conqueror, the spiritual tenure of *franc almoign* was converted into the feudal tenure by barony; and the bishops, now constituted barons, became of course members of the great council, or parliament, of the nation. In consequence of this change, when, upon one occasion, the bishops declined sitting and voting in the House of Lords, the king availed himself of his right implied in the feudal tenure, and commanded their attendance. The ecclesiastical barons are likewise members of the Upper House by writ or summons of the crown; a circumstance which, according to Lord Coke, is equivalent in this respect to a barony. But, exclusive of that circumstance, and exclusive, too, of the right connected with their baronies, the spiritual lords hold their seats by patent or creation; so that they are lords of Parliament in three ways, as barons, by writ, and by patent. Hence all the deeds of the Upper House run in the name of "The Lords spiritual and temporal," and hence the bishops have the precedence of all barons whatever. Sir William Blackstone is of opinion, that, in the absence of the temporal peers, a vote of the bishops alone would be considered as a vote of the House; though it was decided by the judges, (7th Hen. VIII.) that the king might hold a parliament without any spiritual lords. But the bishops, while they are acknowledged as lords of Parliament, are not regarded as peers of the realm. (Staunford, *P. C.* 153.) They do not sit in the court of the Lord High Steward; and though they may *stay and sit* in cases of trial for capital offences before a full parliament, yet they must retire before the vote of guilty or not guilty takes place. The exclusion of the bishops in both of these instances arose from this, that, by the canons of the church, they could not be judges in matters of life and death. For some such reason, too, or from the want of nobility in blood, a bishop cannot be tried in the court of the high steward. As ecclesiastical functionaries, the prelates have the rights of dedication, confirmation, and ordination, as well as those of suspension, deposition, deprivation, and excommunication; they collate to benefices, and direct institution and induction in cases of presentation by other patrons; they take care of the probate of wills, and grant administrations; and they certify to the judges in affairs of lawful and unlawful marriages and births. In England there are twenty-four bishops, exclusive of the bishop of Sodor and Man. Among themselves, the bishops of London, Durham, and Winchester, have the precedency of the others in the order in which we have mentioned them. The rest follow, with some official exceptions, according to the date of their consecration. A bishop has the style of *My Lord*, and is addressed *Right Reverend Father in God.* See Stillingfleet's *Works*, vol. i. p. 371. and vol. ii. p. 396. King's *Constitut. of the Primit. Church*, ch. i. &c. Prettyman's *Elem. of Chr. Theol.* vol. ii. p. 376, *et seq.* Campbell's *Ecclesiast. Hist.* vol. i. p. 84, *et seq.* Mosheim, vol. i. p. 104, *et seq.* Brown *On Church Government*, p. 281, *et seq.* *Altare Damascenum, passim.* (*h*)

BISHOP AUCKLAND. See AUCKLAND.

BISHOPS STORTFORD, a market town of England, in Hertfordshire, situated on a rising ground upon the river Stort, in the midst of a fertile corn country. The town consists of four principal streets, intersecting each other at right angles, in the direction of the four cardinal points. The church, dedicated to St Michael, is a handsome Gothic building, situated on an eminence. The free school is an elegant square building opposite the church, and stands upon arches, beneath which is a place for shops. On an artificial mound between this town and the village of Hockerel, are the remains of an ancient castle, built in the time of William the Conqueror, though others suppose that it was erected previous to the Norman invasion. A considerable trade is carried on in brown malt, which is sold to the brewers in London, to which it is conveyed by a navigable canal which joins the river Lea. Number of houses 421. Population in 1801, 2304, of which 453 were returned as employed in trade and manufactures. See Salmon's *History of Hertfordshire.* (*w*)

BISMUTH. See CHEMISTRY and ORYCTOGNOSY.

BISNAGUR, or BIJINAGUR, and sometimes written BEEJANUGGUR, is situated on the southern bank of the Toombuddra river, in the country of Mysore, and was formerly the capital of a powerful kingdom of the same name in Hindostan, which extended from Cape Comorin to the frontiers of Orissa. According to the Portuguese writers, it was built by Prince Boka, about the year 1200, and was then called Visianagur; but Ferishta relates, that it was founded by Belaldeo, king of the Carnatic, in 1344, in order to guard the northern frontier of his empire. In 1565, it was a very large city, about twenty-four miles in circuit, and containing within its walls a number of hills and pagodas. Its ruins are very extensive, nearly eight miles in circumference, and many of its temples are still remarkably beautiful. Several streets, from 30 to 45 yards wide, have been traced among its rugged hills and rocks; and one particularly, about 35 yards in breadth, and extending half a mile in length, with colonnades of stone on each side, and a very large pagoda at one end, is said to be in a state of complete repair. The soil in its neighbourhood is fruitful, and well watered, abounding in cattle and deer. Its inhabitants are well shaped, and very ingenious in watering and painting calicoes, which is the chief trade of the place. It lies directly opposite to Annagoondy, is about half a mile distant from Fort Comlapour, 140 geographical miles or eight days journey from Goa, 172 miles north of Seringapatam, and 132 south of Visiapour. Its N. Lat. is 15° 15′, and its E. Long. 76° 34′. (*q*)

BISSAGOS. See Bijuga.

BISSAO, is an island on the western coast of Africa, north of the Bijuga channel, the centre of which lies in about 11° 30′ N. Lat. and 15° W. Long. Some geographers, as we have already observed, incline to class it with the Bijuga islands; but, in our opinion, it would, along with the neighbouring ones on the same side of the channel, more properly form a separate groupe.

Bissao is above 40 miles in length, and is said to be from 35 to 40 leagues in circumference: it gradually rises from the shore to the centre, where there are hills discharging springs, which fertilize the country. The soil is rich, and productive of fruits, grain, and other vegetables; orange trees grow to an extraordinary size; and the land is cultivated to great advantage.

The natives of this island are a race of people called Papels, who in appearance are rather good looking, and in character are reputed industrious and faithful to those whom they serve. Their dress is a piece of cotton put round the loins, hanging down to the knees, but boys and girls go naked. All are idolaters, and offer sacrifices of cocks, dogs, and oxen, which are carefully fattened, and, when cut in pieces at the sacrifice, are eaten by the king, his attendants, and those who are present. They suppose their divinities reside in consecrated trees, on which they hang the horns of the oxen as an offering. The principal idol of the natives is called *Chine*, but they have very indistinct ideas of its powers or properties. They entertain strange and extravagant superstitions concerning witchcraft, firmly believing that one may be bewitched by another, who gradually devours him by sucking his blood. Of this Captain Beaver relates a remarkable instance within his own knowledge: and here we can trace a faint analogy to the credulous times of antiquity in Britain, when it was credited that the wasting of an image was fatal to the life of the original. Some of the free natives employed by that officer accused two of their own number, asserting, that one of them could transform himself into an alligator, and devour people; and that the other was said not to be a good man, because he wished to eat his companion; that he had long been reputed a wizard; and that his messmates, in the voyage from Bissao to Bulama, could hardly be restrained from throwing him overboard. Many people, the accusers affirmed, had been destroyed by his infernal art, which was the reason he had left his own country; and if ever he returned he would be sold for a slave: They therefore requested permission to punish the two culprits after their own fashion, by tying them to a tree, and flogging them, promising at the same time that their lives should be safe. Captain Beaver, willing to save the men, endeavoured to dispel the apprehensions of their companions; and to give him, who was accused of transforming himself to an alligator, an opportunity of self vindication, inquired whether the assertions were true. "Yes," replied the man, "I can change myself to an alligator, and have often done it." The singular coincidence between the belief of these people and the superstitions of old in this kingdom, when confessions were made of witchcraft, cannot escape observation.

Bissao.

The island of Bissao is ruled by thirteen chiefs, who are generally at war among themselves; however, some French authors affirm, that there is only one king, who has eight subordinate chiefs, each governing a province. The natives carry on frequent wars in their canoes which contain 20 or 30 men, though they commonly last only a few days. The warriors, on their return, are received with great rejoicings; and the prisoners whom they have taken are sold for slaves, and produce much emolument.

About two centuries ago, the Portuguese established a settlement on Bissao, which still subsists; but the French claim the discovery of the island, maintaining, that some Normans anciently fixed themselves there, and afterwards withdrew, owing to the decline of their trade. The profits of the Portuguese, and the product of traffic from the island, being 400 negroes yearly, 500 quintals of wax, and 300 or 400 of ivory, induced them to return. It is probable that they intended to expel the Portuguese by force, as the governor-general of Senegal provided a body of troops, and in March 1700 appeared before the settlement with seven ships of war. The Portuguese not being in a state to make opposition, the French, with the permission of the native chiefs, established a factory, and, by their enterprize and activity, soon engrossed the whole trade. In consequence of this change of circumstances, the Portuguese demolished their buildings, and abandoned the island. Their absence, however, does not appear to have been long: They returned, and constructed a large regular square fort, with four bastions, on which are now mounted nearly 50 guns, and it contains a garrison of about 300 or 400 soldiers. The traffic increased, and they sent no less than 2000 slaves yearly to Brazil, besides carrying on a trade with Europe. Most of these slaves were purchased from the Mandingoes at Geba, some from the Cacheo and Casamanza rivers, a number from the Naloos, and a few from the Bijuga and Biafara nations. The slaves now purchased by the merchants of Bissao, are procured by means of a class of the natives called Grumetas, who have usually been reared from infancy in their houses, and, for the most part, are a sober, industrious, and faithful class of people. While the merchant seldom quits his own habitation, they navigate all the small craft, or are sent to the interior of the neighbouring continent with goods, the return for which they faithfully bring home. But, of late years, the trade of the Portuguese in that quarter has greatly declined, though vessels from different parts of the world employed in the slave trade occasionally reach Bissao. The French at present have no settlement there, nor do we know when they left the island for the second time: Some years ago, we believe, it was in contemplation to return, as they supposed that 1500 slaves, and likewise a great quantity of ivory, wax, and rice, might be annually obtained. See Delajaille *Voyage au Senegal*. Durand's *Voyage to Senegal*. Beaver's *African Memoranda*. (c)

BISSENPOUR, a small district in Bengal, under the government of a Bramin family of the tribe of Rajpoots. It is entirely surrounded with water; and, by opening the sluices of the rivers, the whole country can in a short time be completely inundated. By the singularity of its situation, its inhabitants have uniformly maintained their independence, making only a show of submission, and paying occasionally a voluntary tribute to the Moguls. In this district, the laws and character of the Hindoos are said to be found in their most unadulterated state; and the golden age, if the accounts of historians are to be credited, still exists among this favoured people, in all its purity and simplicity. Here, we are told, though we are not hasty to believe, that the stranger is completely secure under the protection of the laws; that he is provided with guides, who are responsible for the safety of his person and property; and that, if he remains no more than three days in the same place, he is maintained and forwarded at the expense of the state; that robbery is unknown; and that so prevalent is the spirit of probity, that, should any one find a purse, or any other article of value, he hangs it upon the next tree which he meets, and informs the nearest guard of the circumstance, who immediately gives notice to the public by beat of drum. See Raynal's *History of the East and West Indies*, vol. i. p. 415. (q)

BISSEXTILE, or LEAP YEAR. See CHRONOLOGY.

Boundaries.

BITHYNIA was an ancient kingdom of Asia Minor, bounded on the north by the Euxine Sea, on the east by the river Parthenius, on the south by mount Olympus and the river Rhyndacus, and on the west by the Propontis and the Thracian Bosphorus. The information which we derive from the page of ancient history respecting this country, is so full of contradictions, that it appears impossible to ascertain what leader laid the foundations of this dynasty, or what people obeyed his command. But as we meet with the Cimmerii, the Mariandyni, the Bebryces, the Caucones, the Dolliones, roaming through this region at an early period, it is probable that it was first inhabited by various independent tribes. But, instead of conducting Ninus to the conquest of this country, by the doubtful light of Diodorus; instead of repeating the tale of Appian, concerning the 49 kings who reigned there before the Romans visited Asia; instead of marching with the Thracians, from the ruins of Troy, to take possession of this region,—we shall confine ourselves to that period of its history which, being better authenticated, claims more deservedly our attention.

Pru

From the doubtful light which first rises on the history of this country, we imagine, that Prusias governed in the time of Crœsus, and that he was subjugated by the Lydian prince. But the conquerors and the conquered were doomed to yield to the Persians, under Cyrus the Great; and under their yoke Bithynia groaned till Alexander broke the power of Persia, and annexed it to his vast empire. Bas, the son of Boteras, governed about this time the dependent kingdom of Bithynia; but, disdaining the name without the dignity of royalty, he inspired his subjects with his own independent spirit, defeated Calentus, whom Alexander sent against him, and maintained his freedom during a long reign of 50 years. Zipoetes, who succeeded him, waged an unsuccessful war with the brave inhabitants of Heraclea; but would have reduced to subjection the Chalcedonians, whom he next invaded, if he had not been forced to abandon the siege of their capital, to oppose the army of Antiochus Soter, king of Syria, which, commanded by Patrocles, suddenly burst into Bithynia. He did not long survive a complete victory, which by valour and stratagem he gained over the Syrians, but, in the 48th year of his reign, left the kingdom to his son Nicomedes. This prince disgraced his throne by the inhuman murder of two of his brothers. Zipoetes, the youngest, fled to Asiatic Thrace, and engaged the inhabitants to a[illegible]sert his cause. Nicomedes, when ready to reduce that revolted province, was informed that Antiochus was preparing to fall upon him. Distrusting his own power, he invited, from the western shores of the Bosphorus, the Gauls into Asia, and promised them a settlement in that country. Assisted by these barbarians, he defeated Antiochus, expelled his brother, and, either from a principle of justice or fear, yielded the territory which his brother possessed to the Gauls, which from them was denominated Galatia. Nicomedes employed the remainder of his reign in building a magnificent city, to be the capital of his kingdom, and which, from his own name, he called Nicomedia.

Tibites, his youngest son, to whom, at the instigation of that prince's mother, he had bequeathed the kingdom, succeeded him; but Zela, his eldest son by a former marriage, left Armenia, whither he had been banished by the intrigues of his stepmother, procured the assistance of the Galatians, expelled his brother, and ascended the throne. But Zela perceived, that the band which he had employed against his brother might soon be employed against himself, and began to suspect the fidelity of those whose power he dreaded. Wanting courage to subdue their

Bithynia.

arms, he had recourse to treachery, and, inviting the nobles of Galatia to a splendid entertainment, he prepared a band of ruffians to assassinate his guests; but the Galatians received private intelligence of his design, and murdered him at the beginning of the entertainment.

Though his son Prusias II. was successful in the wars which he waged against the Byzantines and the Galatians, yet he acquired a more distinguished renown when he invaded Pergamus, assisted by the wisdom and valour of Hannibal. That consummate general, forced by the ingratitude of his country to seek an asylum in a foreign land, arrived at last at the Bithynian court; and such was the influence, which his transcendent genius acquired over the mind of Prusias, that at his solicitation, he renounced the friendship of the Romans, and declared war against Eumenes, who was under their protection. But Eumenes, depending upon the aid of the Romans, though still more upon the energy of his own mind, defeated his forces both by sea and land, and reduced him to such distress that he was ready to accept of peace. But the restless mind of Hannibal, ever fruitful in resources, informed that Philip king of Macedon was enraged against Rome and Pergamus, endeavoured to wield the resentment of that monarch to accomplish his own revenge, and persuaded him to join his army to that of Prusias. Prusias renewed the war, and employing various stratagems invented by Hannibal, saw his arms crowned with the most brilliant success. But the Romans, trembling for the fate of Eumenes, sent ambassadors to mediate a peace between the contending princes, and to induce Prusias to deliver Hannibal into their hands. The glory which Prusias had gained on the field of battle, was tarnishd by his ingratitude to that illustrious hero, whom, the price of Roman friendship, he abandoned to his nplacable enemies. Indignant at the treachery of rusias, Hannibal deserted a court that was unwory of his presence, and retiring to Libyssa, put an nd to his life.

Prusias now became the slave of the Romans, joind them against the Macedonians, and went to Italy congratulate them upon this success. But before e entered Rome, he laid aside the ensigns of royalty, nd, in the dress appropriated to slaves when they ceive their freedom, was introduced into the senate. His meanness and servility sealed the degradation of is own mind, but could not be grateful to that verable assembly, nor reflect glory upon the majesty f the Roman name. He returned home; but the storic muse would blush to describe his conduct terwards, in which, without the semblance of one rtue, was exhibited every vice which could entail isery upon his subjects, or infamy upon himself. ut the memory of his past achievements made him ill formidable to his neighbours; and when he heard at Attalus had succeeded his brother Eumenes, he gain invaded Pergamus, entered the capital of that ingdom, and exercised the most unrelenting cruelty during the space of three years. At the end of that period ambassadors from Rome arrived to reconcile the hostile princes, and a conference was agreed to, upon the confines of the two kingdoms. But Prusias, following his dark policy, endeavoured with his army to cut off Attalus and the ambassadors, who were repairing to the place appointed, but his design was discovered, and they escaped by flight. The senate threatened vengeance, but Prusias would have despised threatenings, if he had not been informed that Athenæus, the brother of Attalus, with a powerful fleet, was spreading devastation along the Bithynian coast, and that Attalus himself had raised another formidable army. Peace therefore was at last obtained, and Prusias sent his son Nicomedes to Rome, either to complete his education, or to procure from the senate a remission of some disagreeable articles of the treaty. But Nicomedes no sooner gained the friendship of the Romans, than the suspicious mind of Prusias became jealous of his designs. Prusias immediately sent Menas, one of his favourites, to Rome, as his ambassador, but with the private design of cutting off Nicomedes. Whether fear or remorse animated the mind of Menas, we are uncertain, but he revealed the unnatural design to the son; and the danger to which, from that moment, both were exposed, incited them to secure themselves by the death of Prusias. Nicomedes set sail for Pergamus, procured the assistance of Attalus, invaded the territories of his father, and was every where received as the deliverer of his country. Not daring to trust the few Bithynians who still remained with him, Prusias fled from city to city, in the fond expectation that ambassadors would arrive from Rome to adjust the differences between him and his son. Ambassadors did arrive, but they were men who could form no decisive measures, nor give them efficacy if formed, and proved that the Romans could sport with the feelings of a prince, who had taught them to despise him. Nicomedes and Attalus advanced to Nicomedia, where Prusias had shut himself up; the gates were immediately thrown open by the revolting inhabitants; and in the temple of Jupiter, whose sanctity could afford him no protection, the father fell by the hand of his son.

Nicomedes II.

Nicomedes II. ascended the throne, but not to realise the hopes of his country. Though he assumed the name of *Epiphanes*, or the *Illustrious*, yet the only action which he performed, during a reign of 42 years, to vindicate his claim to that lofty appellation, was the murder of his brothers. He died a violent death; but that it was inflicted by his son appears to be a conjecture originating in that love of retributive justice which is natural to man. His son, Nicomedes III. overran Paphlagonia, invaded Cappadocia, expelled Ariarathes, and to secure the kingdom to himself, married the mother of that prince. But Ariarathes procured the assistance of Mithridates the Great, who not only drove Nicomedes from that kingdom, but expelled him from his own dominions. Being restored by the Romans, in an ill-fated hour he invaded the kingdom of Mithridates, and that high-spirited prince met him on the banks of the Amnius, dissipated his forces with dreadful slaughter, and again forced him into exile. The Romans again seated him on the throne, but dying soon after, he left his dominions to his son Nicomedes IV., whose name can only claim a place in the page of history as the last of the Bithynian kings. As he had no son, he left his kingdom to the Romans. A daughter, named Musa,

Nicomedes III.

Nicomedes IV.

[illegible] adopted [illegible] contemp- [illegible] most power- [illegible] of the [illegible] it was there- [illegible] discovery of [illegible] which shall [illegible] that cannot be [illegible] the corrosiveness [illegible] impairing their me- [illegible] that led Mr Black [illegible] properties of magnesia, [illegible] conceive and execute the [illegible] upon the nature of causticity [illegible] upon what it depends. This [illegible] destined for his inaugural disserta- [illegible] to have delayed taking out his [illegible] had brought his investigation [illegible] of maturity.

Fortunately when he took his doctor's degree, and [illegible] his important discovery of the cause of the [illegible] between limestone and quicklime, mild and [illegible] a vacancy occurred in the chemical [illegible] Glasgow. His friend and master Dr Cullen [illegible] removed to Edinburgh, there could be [illegible] bestowing the vacant chemical chair [illegible] a discovery, which was destined to [illegible] revolution in chemical science. [illegible] appointed professor of ana- [illegible] chemistry in the university of [illegible] 1756. Not considering himself [illegible] professorship of anatomy, he [illegible] the professor of medicine, with [illegible] university.

[illegible] therefore, his lectures on the [illegible] constituted his chief task. They [illegible] by their clearness and sim- [illegible] moderation of his gene- [illegible] likewise a favourite prac- [illegible] and his business [illegible] during his whole stay in Glas- [illegible] greatest part of his time was taken [illegible] medicine, or in increasing his [illegible] knowledge with a view to the im- [illegible] lectures. Chemistry, as far at least [illegible] professionally concerned, constituted but a [illegible] object. This may serve in some measure [illegible] explain the seemingly unaccountable fact, [illegible] ever attempted to enter that vast and tempt- [illegible] investigation which he had laid open.

[illegible] during this period, however, that he inves- tigated and brought to maturity another discovery of [illegible] utmost importance, we mean his theory of *latent heat*; [illegible] discovery which constitutes the foundation of [illegible] whole doctrine of heat as at present taught by [illegible] and which has been attended with more be- [illegible] effects to the world than any other discovery [illegible] during the 18th century; since it occasioned [illegible] improvements in the steam engine by Mr Watt [illegible] instrument which has operated a complete change [illegible] our manufactures. The decisive experiment was [illegible] made in 1761, and Dr Black drew up an account o[illegible] this theory, and read it to a literary society in Glas[illegible] gow on the 23d April 1762. No account of thi[illegible] theory was ever published by its author; but eve[illegible] after it made a most important part of his chemica[illegible] lectures. It became in consequence soon generall[illegible] known in every part of Europe.

About this time likewise he made a set of exper[illegible] ments, to determine whether the expansions of th[illegible] thermometer corresponded correctly with the increase of heat. He satisfied himself that they did so, and that the thermometer measured the increase of tem- perature correctly. The result of his experiments was read to the literary society of Glasgow on the 28th March 1760.

In the year 1766, Dr Cullen, chemical professor in Edinburgh, was appointed professor of medicine, and Dr Black, with the unanimous approbation of the city and university, was pitched upon as his successor. In this new scene, his talents were more conspicuous, and more extensively useful. The celebrity of the medical school of Edinburgh brought him pupils from all quarters, while the increasing importance of chemistry, both in the eye of the philosopher and manufacturer, made the number of chemical students increase every year.

duct of Mr Lavoisier, and vindicating his undoubted claim to his own discoveries. He undertook the task, and began it repeatedly; but his anxiety never failed to bring on a fit of illness, which obliged him to relinquish it. What reason he had to be dissatisfied with Lavoisier, or what private steps that celebrated philosopher may have taken to detract from Dr Black's reputation, we pretend not to say. Lavoisier certainly did Dr Black ample justice in the first treatise on chemistry which he published; for the whole treatise is little else than a history of Dr Black's discoveries with respect to the alkalies and lime, of the controversy which these discoveries occasioned in Germany, and a recitation of his own experiments, which convinced him of the truth of Dr Black's opinions. Of Dr Black's discoveries in other branches of the science, Lavoisier could not be supposed to know much with accuracy; for Dr Black had published nothing respecting them himself, and those writers who had touched upon these subjects, whether in Britain or on the continent, had been either silent with respect to Dr Black's merit as an original discoverer, or arrogated to themselves an equal claim to originality with Dr Black himself.

As to Dr Black's private character, it was, in the highest degree, amiable and excellent. His temper was mild and placid; his disposition serious but cheerful. His sense of propriety was extremely acute, and all his actions were obviously guided by it. This appeared to a striking degree in his dress, in his house, at his table, in company, and in his lecture room. Every thing was done at its proper time; every thing was found in its proper place. He was never in a hurry, but always appeared to have leisure at command; and he was always happy to see a friend, and to enter into conversation on general subjects. His acquaintances sometimes accused him of penuriousness; but Dr Ferguson, who was his near relation, and had the best opportunity of knowing his character, directly denies the charge; and Professor Robison has given such instances of a contrary conduct, as seem totally incompatible with such a disposition. His person was rather above the middle size; he was of a slender make; his countenance was placid, and exceedingly engaging.

But in giving the history of a literary character, the points of greatest importance are undoubtedly his works, which constitute the grand eras of his life. In a philosopher, the additions which he made to the stock of our knowledge, and the exertions which he made towards the advancement or the general diffusion of the sciences, constitute the great characters which distinguish him from the generality of mankind. We must not, therefore, quit Dr Black, without pointing out his literary labours more particularly, and endeavouring to estimate the obligations which chemistry lies under to him for his sagacity and discoveries.

If we were to estimate the merits of a literary man from the bulk of his writings, Dr Black would be rated very low. The only pieces which he published in his life-time were four essays: 1st, His inaugural dissertation, entitled, *De acido a cibis orto et de magnesia*; 2d, *Experiments upon magnesia alba, quick-lime, and other alkaline substances*, first published in the *Edinburgh Physical and Literary Essays* in 1755, and afterwards in a separate form by Mr Creech; 3d, *Observations on the more ready freezing of water that has been boiled*, published in the *Philosophical Transactions* of London for 1774; and, 4th, *Analysis of the waters of some boiling springs in Iceland*, published in the second volume of the *Edinburgh Transactions*. After his death, his manuscript lectures were revised by Professor Robison, and published by his executors in two quarto volumes. This book possesses great merit, especially the first part of it which treats of *Heat*. The simplicity of the style, and the exquisite taste and propriety displayed in the illustrations, cannot be too highly praised; though, as a whole, it is certainly very different from what it would have been, had it received the last corrections of the author himself. The arrangement in many parts is extremely defective; and, as a collection of chemical facts, it is nearly twenty years behind the period at which it finally appeared. Had it been published in 1788, it would have contributed essentially to promote the progress of the science; it would have increased the reputation of its author, and been a highly popular book even in the hands of the students; but, in 1803, its place was supplied by others, exhibiting a fuller detail of chemical facts, and bringing the progress of the science down to the date of their publication.

In taking a view of these different publications, we may pass over the first entirely. The second was, in fact, a repetition, or rather a more complete investigation of the different points touched upon in the inaugural dissertation.

1. The essay on magnesia and quick-lime embraces two distinct objects: 1st, The properties of magnesia; 2d, An investigation of what constitutes the difference between quick-lime and limestone, between the mild and caustic alkalies.

Magnesia had been discovered by a Roman canon at Rome, about the beginning of the last century; and a few of its properties had been ascertained by Frederick Hoffmann; but chemists, in general, considered it as a variety of lime, and none knew the peculiar characters by which it is distinguished. Dr Black ascertained its properties with precision, and demonstrated that it is a peculiar earth. To him, therefore, in reality, we are indebted for our knowledge of magnesia. He combined magnesia with sulphuric, nitric, muriatic, and acetic acids, and ascertained the properties of the salts formed; compared them with similar salts of lime, and pointed out the essential differences. He determined the effect of heat upon magnesia; shewed that it deprived it of a quantity of air; that the magnesia continued still tasteless and insoluble in water; that it combines with acids without effervescence, and forms with them the very same salt as common magnesia. He determined the affinity of magnesia for acids, when compared with lime and alkalies; and pointed out the difference between it and alumina, and the earth of bones.

The investigation and determination of the properties of magnesia, though an object of great importance, sinks into insignificance when compared with e second part of this important essay, difference between quick-lime and and caustic alkalies, common and ia. By the most simple but decisive demonstrated, that limestone and the ntain a quantity of air fixed in them; kes its escape when they are dissolved is dissipated when limestone is burnt; rendered caustic by being deprived of s a greater affinity for it than alkalies; from them when mixed with them. son why quick-lime renders alkalies by the process, it is converted itself

The caustic alkalies, quick-lime, gnesia, are the substances in a pure he reason of the activity which they their dissolving in acids without effers air he called *fixed air*, because it heir bodies. He inferred, that it pos properties; that it differed from comit existed in the atmosphere; and that nt kinds of air possessed of peculiar it he made no experiments himself on t drew his inferences from common of a kind, however, sufficiently decishewed, that it acted as an acid; that h alkaline substances in different pro he announced his intention of proseect at greater length hereafter; a prowhich he never fulfilled. It is impos too high praise upon Dr Black's paia and quick-lime. The modest simarration, the number and conclusiveeriments, the sagacity with which the es are drawn, the accuracy and decireasoning, and the small number of hich the author fell in prosecuting a new, and quite the opposite of the pinions of chemists, are all admirable, fficiently for the high rank to which ly raised the author among chemists. w of no chemical dissertation whattand a comparison with the essay of r Lavoisier's papers are much more ist in appearance, and the consequences es from his experiments are, perhaps, ance than even the discoveries of Dr discoveries were the result of a whole e most laborious industry, whereas Dr discovery was completed at the age of

he publication of Dr Black's essay, apothecary at Osnaburgh, published in order to explain the differences be and quicklime, the caustic and mild conclusions were quite different from lack. According to him, limestone fire with a peculiar acid, which he *lum pingue*, or *causticum*. To this he peculiar acrid properties which it cination. Alkalies had a stronger af cid than lime. Hence, when potash are mixed, the lime loses its acid, and ss and insoluble in water; while the ith the acid and becomes caustic. Meyer's hypothesis being contrasted with Dr Black's theory, which soon became known in Germany, occasioned a violent controversy, which lasted some years. Jacquin, botanical professor at Vienna, published a Latin dissertation in defence of Dr Black's doctrine in 1769. This was opposed, in 1770, by Dr Crans, physician to the king of Prussia, who defended the hypothesis of Meyer in a very elaborate treatise. In 1774, Lavoisier published a treatise on the subject. He repeated the experiments of Dr Black and his disciples, and confirmed them in every particular. Since that period, Dr Black's theory of causticity, and his doctrines respecting fixed air, have been universally admitted by the chemical public.

Dr Black's essay drew the attention of philosophers to the elastic fluids, and in particular to *fixed air*, which he had shewn to act so important a part in nature. Dr Macbride of Dublin was the first who wrote on the subject. His essay appeared in 1764. He examined the fixed air evolved during fermentation, and pointed out its properties in retarding putrefaction. But it was Mr Cavendish who first examined the properties, and pointed out the characters of fixed air. His essays on the subject were published in 1766 and 1767. Dr Priestley followed soon after, and laid open the different elastic fluids in succession. Thus Dr Black's discovery is not only important in itself, but it acquires additional value, because it led the way to pneumatic chemistry, and was therefore the foundation of the complete revolution which the science underwent.

2. The paper on the freezing of boiled water, published in the *Philosophical Transactions*, is very short, and requires but little notice. He found, that water which has been newly boiled always freezes sooner than common water. The reason, he says, is, that boiled water cannot be cooled lower than 32°, without beginning to freeze; whereas common water may be cooled several degrees lower, without losing its fluidity. This difference he ascribes to the boiling, which has deprived this water of its air. Hence, when exposed to the air, that elastic fluid begins to enter, and occasions a constant agitation, which, though imperceptible to us, is yet sufficient to prevent the water from being cooled lower than 32° without freezing. This explanation is simple and ingenious, and probably correct. Though some of the experiments of Sir Charles Blagden, on the cooling of water below the freezing point, without losing its fluidity, appear at first sight incompatible with it.

3. The analysis of the Geyser and Reykum waters, which Dr Black published in the second volume of the *Edinburgh Transactions*, is one of the finest specimens of the analysis of mineral waters which has yet appeared. Dr Black has contrived to throw an interest on his subject, of which one would hardly have conceived that it would have admitted. This appears in a very striking point of view, when compared with the essays of Bergman, Klaproth, Fourcroy, Vauquelin, or any other of the consummate masters of the art of analysing mineral waters. The interest which we take in the analysis of Dr Black, is much greater than in that of any other person. The

analysis is remarkably correct, and the methods followed are the best that we are yet acquainted with; though his directions for preparing the filtres can scarcely be followed at present. His mode was tedious; and his reliance upon the filtre much greater than it ought to have been. Chemists at present seldom trust to experiments made by weighing filtres. They are so apt to change their weight, and their tendency to absorb moisture is so great, that they cannot be easily weighed in a delicate balance. A filtre, weighing thirty grains, if dried at the fire, will absorb half a grain of moisture before you can weigh it.

4. The only part of the posthumous work, entitled Dr Black's *Lectures*, that requires animadversion, is his doctrine of *latent heat*, contained in the first part of that book. This doctrine he brought to maturity while in Glasgow. He read an account of it to a philosophical society in that city, in the year 1762. Ever after it was taught by him with great care, and sufficiently in detail, constituting indeed one of the most important and interesting parts of his course. This theory is not only in itself highly beautiful and valuable, as it constitutes the basis of the whole doctrine of heat, one of the most instructive branches of chemical science; but it has another claim upon our attention,—it led to Mr Watt's improvement of the steam engine, which has produced such mighty changes in our system of mining and in our manufactures, and which has so enormously increased the powers and the resources of man. Dr Black's two discoveries hold a most interesting position; the first occasioned a complete revolution in the science of chemistry; the second an equally complete revolution in some of our most important arts and manufactures. The theory of latent heat, which Dr Black deduced from an attentive observation of some of the most common phenomena of nature, and from some experiments of Fahrenheit, may be stated in a few words. When ice melts, it combines with a quantity of heat which enters into it, and remains in it without increasing its temperature. Hence it was called *latent*. When water freezes, it parts with the whole of this latent heat; and it cannot freeze till it does so. Hence the slowness of the processes of freezing and melting. Water then is ice, combined with a certain quantity of heat. In like manner, when water is converted into *steam*, it combines with a quantity of heat; and when steam is condensed into water, it parts with a quantity of heat. In general, when solids are converted into liquids, they unite with a quantity of latent heat; and when liquids are converted into elastic fluids, they likewise combine with latent heat. This theory was demonstrated by the most obvious, but decisive experiments, and it was applied, with much sagacity, to explain some of the most important phenomena of nature. In his experimental investigations of the quantity of latent heat in different bodies, Dr Black was much assisted by his two celebrated pupils, Mr Watt and Dr Irvine. He first suggested also the curious fact, that bodies differ in their capacity for heat; that is to say, that the same quantity of heat does not produce the same change of temperature upon different bodies. Thus it requires much more heat to raise a pound of water 100 degrees, than is necessary to produce the same change of temperature on a pound of mercury. This subject was carried much farther by Dr Irvine, who made some curious discoveries respecting it, and even applied it to explain Dr Black's great discovery of *latent heat*. His explanation was adopted by several ingenious philosophers; and there are still some persons who consider Dr Irvine's explanation as preferable to Dr Black's. Dr Black himself stated some objections to Dr Irvine's explanation, with his usual modesty, which appear to be fatal to it. Dr Crawford afterwards investigated the capacity of different bodies for heat with much industry and success, and founded on it his ingenious explanation of the source of animal heat.

Though Dr Black never himself published any account of his peculiar opinions respecting *latent heat*, they soon came to be generally known all over Europe, in consequence of the great concourse of students from all quarters that attended the chemical class at Edinburgh. Various dissertations both respecting latent heat, and the capacity of bodies for heat, were published at different times, and in different places. The authors seldom or never refer to Dr Black; but tacitly assume to themselves the merit of originality. And, in consequence of Dr Black's indolence and carelessness, it is now almost impossible to determine how far these claims were well or ill founded. That Dr Black was the original discoverer, and that he had taught the doctrine publicly, at least ten years before any competitor appeared, is perfectly established. But whether the subsequent authors derived their information from students who had attended Dr Black's class, or had stumbled themselves upon the theory which they published, it is now very difficult to say. The first publisher on the subject was Mr Wilcke of Sweden, whose dissertation on the capacity of different bodies for heat, appeared in 1773. Lavoisier and Laplace published their experiments on the heat necessary to melt various bodies, and upon the heat evolved during combustion about the year 1777. Mr Cavendish, in a dissertation published about the year 1785, claims as his own the discovery of latent heat; but says in a note, that he understood that Dr Black teaches a similar doctrine. As to the attempt of De Luc, in his *Idées sur la Meteorologie*, to claim the original discovery of latent heat, it does not seem entitled to any attention whatever; and has been sufficiently exposed by Mr Watt and Professor Robison. Mr Cavendish, from the character of the man, and the great sagacity which he possessed, would be the most likely to have hit upon the theory. But it became so generally known, and so much had been written upon it before his claim appeared, that it is impossible to doubt that he had imbibed his opinions respecting heat from these publications; and certain opinions respecting heat being adopted, the doctrine of latent heat followed as an easy consequence. Upon the whole, Dr Black's originality admits of no doubt; and had he published an essay on the subject, as he did with regard to fixed air, no competitor whatever would have appeared; and his rank as a discoverer, at least among the chemists of the con-

Black.

tinent, would have stood higher than it does at present.

5. We cannot conclude this article, without mentioning a circumstance regarding Dr Black, which does not appear to be generally known. We relate it on the authority of the late Benjamin Bell, Esq., surgeon in Edinburgh, who had it, as he informed the writer of this article, from the late Sir George Clerk of Pennycuick, a particular friend of Dr Black, and an eye-witness to the circumstance. When Mr Cavendish, in 1766, ascertained the specific gravity of hydrogen gas, it occurred to Dr Black, that it might be employed to raise weights in the atmosphere. He procured the alantois of a calf, filled it with hydrogen gas, and found, that the bag, thus filled, was lighter than air, and would rise to the ceiling of the room. He invited a number of his friends to supper, and told them, that he had a curiosity to shew them. When the company met, he produced his prepared alantois, and, to the surprise of all present, it ascended, and remained attached to the ceiling of the room. At first, they supposed that a fine thread had been attached to it, and that some person in the room above had drawn it by that means to the ceiling. But an actual inspection convinced them, that this solution was erroneous. Dr Black then explained to them the way in which it was filled, and pointed out the useful purposes to which such contrivances might be applied. If this statement be correct, and, from the source of the information, there seems reason to rely upon it, Dr Black was in reality the discoverer of the air-balloons; and he made the discovery nearly fifteen years before the idea suggested itself to M. Montgolfier. Unfortunately, all the gentlemen mentioned by Mr Bell, as having been present at the exhibition, are now dead; so that it is impossible to authenticate it by any more direct testimony. (c)

BLACK SEA.

Black Sea.

The Black Sea, formerly called the Euxine * Sea, is an immense inland sea, situated between Europe and Asia, and connected with the Mediterranean by the Straits of Constantinople.

By comparing the accounts of this sea, as given by ancient authors, with the limits assigned to it by recent observations, it appears unquestionable, that it has sustained a most singular diminution, in consequence of some great subterranean convulsion.

From the topographical descriptions of the Black Sea, as collected by Valerius Flaccus, from the ancient accounts of the voyages of the Argonauts, it appears, that the gulfs and bays of this lake were extremely deep; and that, in conjunction with the Palus Meotidis, it extended far towards the north, and almost equalled the Mediterranean in magnitude. In the time of Homer, according to Strabo and Eustathius, the Euxine Sea was regarded as the greatest of all the inland seas; and received the name of *ποντος*, on account of its superior magnitude. Herodotus makes the length of the Euxine Sea, from the Cyanean Isles (now the Pavorante) to the river Phasus, 11,100 stadia, or nearly 17 degrees and a half. Procopius reckons the distance from Chalcedon to the Phasus at 50 days journey, for a good walker, which, at the rate of nine leagues a-day, will make the distance equal to 18 degrees; a result which coincides remarkably with that of Herodotus. As the utmost extent of this sea, however, in the best modern charts, does not exceed 12 degrees and a half, we are entitled to conclude, that it formerly covered the low grounds which stretch towards the base of the mountains of Caucasus.

The north and west coast of this sea seem to have undergone very remarkable changes. The line of its greatest width has undoubtedly varied; and the immense volume of waters which is rolled from Asia and Europe into this capacious reservoir, seem to have completely changed the outline of its coast, and filled up the deep gulfs which indented its shores. The southern coast, which consists chiefly of calcareous rocks, upon which the sea reposes, to a great depth, has suffered but few changes, excepting at the mouths of the rivers; and hence the geographical descriptions of this part of the Black Sea, as given by ancient authors, are more easily reconciled with modern observations.

From these indications of extensive changes, as well as from the testimony of ancient authors, it would appear, that the Sea of Aral and the Caspian Sea once formed an immense lake, joined by a strait to the Palus Meotis and Euxine Sea; and that this huge collection of water was separated from the Mediterranean by a narrow isthmus, formed by the Cyanean Isles. An eruption of these volcanic islands is supposed to have formed an outlet for the exuberant waters of the Euxine, which rolled its torrent with irresistible impetuosity into the Propontis, and afterwards into the Mediterranean, and deluged the low plains of Asia Minor, Thrace, Greece, Egypt, and Libya. The effects of this dreadful inundation are recorded in the monuments, the traditions, the poetry, the history, and the chronology of these ancient nations. The Samathracians, according to Diodorus (lib. v. cap. 47.,) ascribed this deluge to the opening of the mouth of the Bosphorus. Their fishermen dragged out, in their nets, the capitals of columns that belonged to the cities which had been submerged; and, in the time of Diodorus, they offered sacrifices upon altars erected on the line which formed the limits of the inundation. Ister, an ancient author quoted by Eustathius, mentions some great inundations, one of which opened the canal of the Hellespont that separated Europe from Asia; and Strabo and Xanthus bear testimony to the same event, which seems to have happened about 1529 years before Christ.

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* The term Euxine is derived from *αξενος*, *inhospitable*, the epithet given by the ancients to this sea. Hence Ovid,

> *Frigida me cohibent* Euxini *littora Ponti;*
> *Dictus ab antiquis* AXENUS *ille fuit.* OVID, lib. iv. Trist. Eleg. iv.

We shall now proceed to state the evidence in support of this remarkable fact, as collected from the observations of modern naturalists and travellers.

According to Tournefort, (*Voyage au Levant*, tom. ii. p. 124, 125, &c.,) the Black Sea appears to have been an immense lake, formed by the waters of innumerable rivers, and unconnected with the Mediterranean, and could only empty itself through the Thracian Bosphorus. The mountains which are interposed between it and the Caspian Sea, prevent any opening towards the east. The waters of the Sea of Azof fall into the Black Sea, from north to south, and oppose any passage in that direction. The rivers of Asia push the waters of the Black Sea from south to north. The Danube impels them from the west. It is therefore at the isles of Cyaneæ alone, between the lighthouses of Europe and Asia, which are situated at the mouth of the Bosphorus, where the waters of the Black Sea could hollow out the earth, and force a passage into the Propontis.

Buffon (*Hist. Nat.* tom. ix.) has adduced innumerable facts to prove, that the Mediterranean Sea, the Black Sea, the Caspian Sea, and the Sea of Aral, have at one time been immense lakes; that the Caspian Sea was formerly of great extent, and that the Mediterranean was once much smaller than it is at present; that the Aral, the Caspian, and the Black Sea, formed only one lake before the opening of the Bosphorus; and that the Mediterranean, after this opening, was augmented in the same proportion as that lake had diminished.

"Siberia, Asia, the Red Sea, &c.," says Pallas, (*Travels*, tom. ix. p. 163.) "present evident marks of this deluge, of which all the ancient people of Asia, the Chaldeans, the Persians, the Indians, the Thibetans, and the Chinese, have preserved the remembrance, and which they have fixed within a few years of the Mosaic deluge. Europe, and the low lands of Asia, have since suffered considerable changes by other inundations, sometimes arising from submarine eruptions, sometimes from the sudden overflow of the great inland seas, as the Mediterranean and the Euxine, which have left dry extensive plains covered with mud; and sometimes to irruptions of the sea, increased by enormous submarine eruptions.

"The opinion of the indefatigable Tournefort and Buffon," the same naturalist elsewhere observes, "upon the ancient state of the Black Sea, and its communication with the Caspian, has been more and more confirmed by the observations of travellers. The sea monsters, the fish, and the marine shells, which the Caspian has in common with the Black Sea, render this communication extremely probable; and the same facts prove also, that the lake of Aral was once joined to the Caspian. In the 3d and 7th volumes of my Travels, I have traced the ancient extent of this sea over all the desert of Astracan and that of Jaik; by that appearance of coasts with which the elevated plains of Russia limit the desert, by the state and the fossil productions of this ancient coast, and by the salted mud mixed with calcined sea shells which cover all the surface of the desert."

The Cyanean Isles, at the mouth of the Bosphorus, have been recently examined by Olivier and Choiseul Gouffier, who discovered that these islands were volcanic. "At the mouth of the canal, on both sides of the Bosphorus," says Olivier, (*Voyage*, tom. i. p. 69.) "we were struck with the marks of a volcano of several leagues in extent. Every where we observed the rocks more or less altered or decomposed; every where we found incontestible marks of the action of subterranean fires. We observed jaspers of different colours, carnelians, agates, and chalcedonies, among porphyries, more or less changed; a breccia, with little solidity, and almost decomposed, formed by fragments of trap, agglutinated by calcareous spar; a beautiful porphyry at the base of a rock of greenish trap, coloured by copper; and through an extent of half a league we saw a hard rock of trap, of a greenish blue, equally coloured with copper." In quoting this able traveller, on the volcanic nature of the banks of the Bosphorus, we ought at the same time to state, that he entertains a different opinion from other naturalists respecting the formation of that strait. He does not believe that the waters of the Black Sea were once more elevated, and that they opened for themselves a passage by the Bosphorus; but he supposes, that the Propontis, the Euxine, and the Mediterranean, always communicated with each other. He is of opinion, that the Caspian was of much greater extent; that it communicated with the Sea of Azof, and that their waters had the same level; and he attributes to the currents of the Don, the Kouban, and the Wolga, the filling up of the canal, and the consequent separation of the two seas. After this separation, he supposes that the Black Sea has not changed its level, because it receives more water than it wastes by evaporation; and that the Caspian Sea has sunk above 60 feet, because it does not receive a quantity of water sufficient to supply what is lost by evaporation; and that it gradually diminished, till an equilibrium existed between the supply and the evaporation.

M. Bergman,* who travelled into the country of the Calmucs in 1802 and 1803, has collected a vast number of facts, to prove that the Asiatic part of the steppes of the Calmucs was once covered with water, and that the Caspian and Black Seas were formerly united.

We shall now conclude this part of the article, by presenting our readers with the interesting description of the appearance of the Thracian Bosphorus, and the nature of the Cyanean Isles, and the adjoining strata, as given by the ingenious Dr Clarke, in his *Travels* into different countries of Europe, Asia, and Africa.

When Dr Clarke, in his voyage from Ineada to Constantinople, first discovered the light tower on the European side of the Bosphorus, it appeared situated as

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* See *Journal Universelle de Litterature, de Halle*, March 1805, No. 56, p. 441, &c.

Black Sea.

the base of an immense range of mountains. The whole coast, on both sides, opened with a degree of indescribable grandeur, and resembled a stupendous wall, opposed to the great bed of waters, in which the mouth of the Bosphorus was like a small crack or fissure occasioned by an earthquake.

"As we entered the straits," says Dr Clarke, "a miserable lantern, placed upon a tower on either side, presented to us all that was intended to serve as a guidance for seamen during the night. Never were light-houses of more importance, or to which less attention has been paid. An officer of the customs put off from the shore in his boat; but contented himself with merely asking the name of the captain, and did not come on board. After passing the light-houses, there appeared fortresses, the works of French engineers; and their situation, on rugged rocks, had a striking effect. Presently, such a succession of splendid objects was displayed, that, in all the remembrance of my former travels, I can recal nothing with which it may be compared. A rapid current, flowing at the rate of a league an hour, conveyed us from the Black Sea. Then, while we were ruminating upon the sudden discharge of such accumulated waters by so narrow an aqueduct, and meditating the causes which first produced the wonderful channel through which they are conveyed, we found ourselves transported, as it were, in an instant, to a new world. Scarcely had we time to admire the extraordinary beauty of the villages, scattered up and down at the mouth of this canal, when the palaces and gardens of European and Asiatic Turks, the villas of foreign ambassadors, mosques, minarets, mouldering towers, and ivy-mantled walls of ancient edifices, made their appearance. Among these we beheld an endless variety of objects which seemed to realise tales of enchantment; fountains and cemeteries, hills, mountains, terraces, groves, quays, painted gondolas, and harbours, presented themselves to the eye, in such rapid succession, that, as one picture disappeared, it was succeeded by a second, more gratifying than the first.

"On the following day, we were determined to adventure an excursion as far as the islands anciently called Cyaneæ, or Symplegades, which lie off the mouth of the canal. The accurate Busbequius confessed, that, in the few hours he spent on the Black Sea, he could discern no traces of their existence; we had, however, in the preceding evening, seen enough of them to entertain great curiosity concerning their nature and situation, even in the transitory view afforded by means of our telescopes. Strabo correctly describes their number and situation. 'The Cyaneæ,' says he, 'in the mouth of Pontus, are two little isles, one on the European, and the other on the Asiatic side of the strait, separated from each other by twenty stadia.' The more ancient accounts, which represented them as sometimes separated, and at other times joined together, was satisfactorily explained by Tournefort, who observed, that each of them consists of one craggy island, but that, when the sea is disturbed, the water covers the lower parts, so as to make the different points of either resemble insular rocks. They are, in fact, each of them joined to the main land by a kind of isthmus, and appear as islands when this is inundated, which always happens in stormy weather. But it is not clear that the isthmus, which connects either of them with the continent, was formerly visible. The disclosure has been probably owing to that gradual sinking of the level of the Black Sea, before noticed. The same cause continuing to operate, may hereafter lead posterity to marvel what is become of the Cyaneæ; and this may also account for their multiplied appearance in ages anterior to the time of Strabo. The main object of our visit was not, however, the illustration of any ancient author in this particular part of their history, but to ascertain, if possible, by the geological phenomena of the coast, the nature of a revolution which opened the remarkable channel at the mouth of which those islands are situated.

"Some time before we reached the mouth of the canal, steering close along its European side, we observed the cliffs and hills, which are there destitute of verdure, presenting, even to their summits, a remarkable aggregate of enormous pebbles, that is to say, heterogeneous masses of stony substances, rounded by attrition in water, and imbedded in a hard natural cement, yet differing from the usual appearance of breccia rocks; for, upon a nearer examination, they appeared to have undergone, first, a violent action of fire, and secondly, that degree of friction, by long contact in water, to which their form was due. Breccia rocks do not commonly consist of substances so modified. The stratum formed by this singular aggregate, and the parts composing it, exhibited, by the circumstances of their position, striking proof of the power of an inundation; having dragged along with it all the component parts of the mixture, over all the heights above the present level of the Black Sea, and deposited them in such a manner, as to leave no doubt concerning the torrent which passed towards the sea of Marmora. As in a field of corn long agitated by a particular wind, we see the whole crop incline towards one direction; so, at the mouth of the canal of Constantinople, all the strata of the mountains, and each individual mass composing them, lean from the north towards the south. On the point of the European lighthouse we found the sea, still tempestuous, beating against immense rocks of hard and compact lava; these had separated prismatically, and exhibited surfaces tinged by iron oxide wherever a division was effected.

"From this point we passed to the Cyanean Isle, on the European side of the strait, and there landed. The structure of the rock, of which the island consists, corresponds with the nature of the strata already described; but the substances composing it were perhaps never before associated in any mineral aggregate. They all appear to have been more or less modified by fire, and to have been cemented during the boiling of a volcano. In the same mass may be observed fragments of various coloured lava, trap, basalt, and marble. In the fissures are found agate, chalcedony, and quartz, but in friable and thin veins, not half an inch in thickness, and apparently deposited posterior to the settling of the stratum, of which the island consists. The agate appeared in a vein of considerable extent, occupying a deep fissure not more than an inch wide, and coated by a green substance, resembling some of the lavas of Ætna, which have been decomposed by acidiferous vapours. Near the same vein appeared a substance resembling native mercury, but in such exceedingly minute particles, in a crumbling matrix, that it was impossible to preserve a specimen. The summit of this insular rock is the most favourable situation for surveying the mouth of the canal; which thus viewed has the appearance of a crater, whose broken sides opened towards the Black Sea, and, by a smaller aperture, towards the Bosphorus. The Asiatic side of the Strait is distinguished by appearances similar to those already described; with this difference, that, opposite to the island, a little to the east of the Anatolian lighthouse, a range of basaltic pillars may be discerned, standing upon a base inclined towards the sea; and, when examined with a telescope, exhibiting very regular prismatic forms. From the consideration of all the preceding observations, and comparing events recorded in history with the phenomena of nature, it is perhaps more than a conjectural position, that the bursting of the Thracian Bosphorus, the deluge mentioned by Diodorus Siculus, and the draining of the waters which once united the Black Sea to the Caspian, and covered the great Oriental plain of Tartary, were all the consequence of earthquakes caused by subterranean fires, described as still burning at the time of the passage of the Argonauts, and whose effects are visible even at this hour."

The Black Sea received its name from the darkness which often covers it, particularly during winter, in consequence of thick fogs and falling rains. This obscurity is often so great, that mariners are unable to see a cable's length from their vessels, and on these occasions the entrance of the Bosphorus is impracticable. Dr Clarke affirms, that there is no sea in which the navigation is more dangerous; that shallows hitherto unnoticed in any chart frequently occur when vessels are out of sight of land, and that dreadful storms come on so suddenly, and with such fury, that every mast is carried overboard almost as soon as the first symptom of a change of weather is observed. Admirals Priestman and Wilson, who commanded the Russian fleet, described the Black Sea as exhibiting tempests more horrible than any thing they had ever encountered in the ocean. This account of the Black Sea is completely contrary to that given by Tournefort. "Whatever the ancients may have said," observes this able naturalist, "the Black Sea has nothing black but the name; the winds do not blow there with more fury; and the storms are not more frequent than in other seas. We must pardon the exaggeration of the ancient poets, and particularly the chagrin of Ovid. The sand of the Black Sea, indeed, is of the same colour with the sand of the White Sea, and its waters are equally pure. If the coasts of this sea, in short, which are reckoned so dangerous, appear gloomy from a distance, it is owing to the woods which cover them, or the great distance which gives them the appearance of blackness. The sky here was so beautiful and so serene during the whole of our voyage, that we could not avoid giving the lie to Valerius Flaccus, the famous Latin poet, in describing the route of the Argonauts, who passed for the most celebrated sailors of antiquity, but who were only very little boys when compared with Vincent le Blanc, Tavernier, &c. This poet assures us, that the sky on the Black Sea is always obscured with fogs." (*Voyage du Levant*, Lett. xvi. tom. iii. p. 1.) The same opinion is stated by Mr Thornton in his Survey of the Turkish Empire. "It is a notion," says he, "received among the Turks, that the Black Sea is dangerous. To them indeed it is truly black; and it would even be so to British sailors in such vessels as the Turks use, and which are peculiar to that sea; they cannot lie to, and are consequently obliged to run before the wind, and if they miss a port, go on shore. It is not more stormy than other seas."

Besides being distinguished by the haziness of its atmosphere, and by the storms with which it is agitated, the Black Sea is remarkable for its extraordinary temperature. Ovid, during his residence on the Black Sea, had observed, the "*ingentem glacie consistere pontum*;" and Dr Clarke was informed by Captain Bergamini, that he was once detained *five months* in the mouth of the Danube by the freezing of the sea.

The Black Sea abounds with sea-worms, which gnaw the planks of vessels, and in the space of two years completely destroy the sides of the ships. These animals are four or five inches long. Their head resembles an arrow, and their body consists of a whitish mucilage. The only way of destroying them has been until lately, to lay up the vessels for two years to careen them, and to cover the sides with burning pitch and juniper wood. The vessels which navigate the Black Sea are now begun to be coppered, which is the only effectual remedy against the attack of these worms.

The force kept by the Russians in the Black Sea, consists of the flotillas of Nicolaïef and Sevastapool. The first of these comprehends 70 or 80 shallops decked and carrying guns, with some others which are row boats. The latter is composed of four vessels of the line, and four or five frigates. This naval force is not under the direction of the Admiralty of St Petersburgh, but under an High Admiral stationed at Nicolaïef.

We shall now conclude this article, by giving some account of the commerce of the Black Sea, for which we are principally indebted to Mr Reuilly, who travelled along its shores so late as the year 1803.

"The storms frequent in the Black Sea," observes that learned traveller, "and the savage state of the people inhabiting its coasts, prevented the Greeks for a long time from visiting its shores. The expedition of the Argonauts is the first trace of navigation and commerce in that sea, which antiquity has transmitted to us.

This trade took place principally in the Oriental parts, but notwithstanding the establishment of several colonies upon its coasts, it was inconsiderable during the first ages of Greece, and under the empire of the Romans. It did not begin to flourish until the time of the crusades, when the Latins possessed themselves of Constantinople: at that time the Genoese and the Venetians carried on this trade with such considerable advantage, that the conquest of Egypt by the Arabs having entirely ruined the ancient commerce of Alexandria, the merchandise of India opened itself a new way to the European markets; they went thither sometimes by the Indies, and the Russian Sea, or were transported by caravans across Georgia and Mingrelia; sometimes by going up the Persian gulf, the Tigris, or the Euphrates; they went, by way of Armenia, to Trebizond, whither the Genoese and the Venetians went to meet them, for the purpose of supplying Europe with their commodities.

Jealousy, the inevitable consequence of the great advantages this commerce procured, was the occasion of some bloody wars between the Venetians and the Genoese, which terminated in the last becoming the masters; by contributing to the overthrow of the dominion of the Latins at Constantinople, profiting dextrously by the favour or the weakness of the Greek emperor, they obtained from them such advantages, that they had no longer any rivals. To secure to themselves this exclusive commerce, they fortified their settlement at Pera, established colonies on the coasts, principally in Crimea, and put their factories in a state of defence: Caffa was the principal city of their commerce with the East, and the port at which was deposited all the merchandise which had been transported to the Black Sea. The merchandise of India, Persia, and Arabia, came to Astracan, went again up the Volga, was carried afterwards by land as far as the Don, distant about sixty versts, conveyed by that river to Azof, and thence embarked for Caffa. The Genoese procured to themselves immense riches, and put themselves in a situation, notwithstanding the smallness of their territory, to hold rank among the first of the maritime powers. They enjoyed these advantages until the taking of Constantinople by Mahomet the Second, of which almost the immediate consequence was, their expulsion from the Crimea. With the annihilation of the power of the Genoese, ended the commerce of the Black Sea.

It is to be observed, that, at this epoch, the re-establishment of the ancient route by Alexandria, which took place under Tala-Eddin, had already turned that source of riches.

The progress of navigation, by the discovery of the route to India, and of America, gave a new spring to the mercantile spirit of the Europeans, lessening, in some degree, the regret which the loss of this ancient seat of their prosperity had occasioned, and turning their thoughts to the means of restoring that advantage. It was not until the beginning of this century that Peter the First, desirous to create commerce, unknown in his vast empire, saw the immense advantage it would derive from the possession of some ports in the Black Sea: he succeeded in the acquisition of Azof; but the misfortunes which he met with afterwards, and the peace of Prouth, was the occasion of his surrendering his conquests, and the advantages that might have been derived from them. Catharine the Second following the steps of this great legislator of Russia, had the glory of accomplishing the design his genius had conceived.

After two long wars, the Turks found themselves compelled to surrender to Russia a part of Lesser Tartary, and, at length, the Crimea; to allow them to establish in that quarter a navy, and to permit their flag the free passage of the Dardanelles.

Austria, the ally of Russia, has partaken of this last advantage, and these two nations alone carried on the commerce, always inconsiderable for want of means and of concurrence, until the time when, after the conquest of Egypt, the French government obtained, by its treaty of peace with the Porte, the free navigation of the Black Sea. It has been granted with the like facility to the other principal powers of Europe in such an extent, that the commerce of that sea may be considered to be absolutely free."

It would appear, from the principal treaty between England and Turkey, that we had a commercial footing in the Black Sea in the time of Queen Elizabeth or James I. In the time of Charles II. the conditions of alliance with England were revised and amplified in 1661–2, by the Earl of Winchelsea, and afterwards in 1675 by Sir John Finch. These treaties gave all the subjects and dependants of England permission to pass and repass with their merchandise into every part of the Ottoman dominions. All the particular privileges which belonged to the French, Venetian, or any other Christian nation, were conceded to the English. In 1799, the freedom of the Black Sea was again given to the English. On this occasion, Mr Smith observes, in the memorial which he presented to the Ottoman Porte, that, " by enabling the English navigator to penetrate the deep gulfs of the Black Sea, and thus rendering the remotest districts accessible to the English merchant, instead of the present languid routine of a single factory superintending two or three annual cargoes, assorted according to the limited consumption of the metropolis, with the refuse of which the provincial traders are scantily furnished at second and third hand, we shall see whole fleets laden with the richest productions of the Old and New World. British capital and credit would attract flourishing establishments in the solitary harbours of Anatolia, from whence the adjacent cities would receive less indirect supplies, and where the landholders find more ready exchange for their produce. Sinope and Trebizond would again emulate the prosperity and population of Aleppo and Smyrna. The Abazes, Lazes, and other turbulent traders who inhabit the mountainous fastnesses, by mixing more frequently with their fellow subjects at these marts, could not fail to learn their real interest to be inseparable from the performance of their duty."

The commerce of the Black Sea embraces, according to Reuilly, that of the Crimea, that of the shores of the sea of Azof, and those of the Abazes; that of Natolia, and of the Ottoman provinces of Asia, of Romelia, of Bulgaria, of Wallachia, and of Moldavia, and, above all, that of Poland and Russia.

" The Crimea is advantageously situated for the purposes of commerce. That peninsula, surrounded by the Black Sea, and by the Sea of Azof, in which the Don empties itself, is able to receive in its ports, principally in those of Kertch and of Caffa, the merchandises of the Indies, of Persia, and of Siberia, in the same manner as in the times of the Genoese. These merchandises, which consist in raw iron, copper, spars, pitch, skins, can come from Siberia, by following the course of the Kama and of the Volga unto Dubofka, or by crossing the isthmus 60 versts, which separate the Volga from the Don; and by being shipped at Katchalinskaya, these merchandises come down by the Don to the sea of Azof, to be carried to Taganro, or directly to Kertsh or Caffa. Butter and fat come also by this route, and with considerable profit to the traders. The sailcloth of the interior part of Russia, the hemp, the linens, of which there are great abundance, above all in the departments of Penza, of Nishnei-Novogorod, and of Woronetz, have a short passage to make to come down by some lesser rivers to the Don.

"A depot of the merchandises which Natolia draws at present from the caravans of Smyrna, and by Constantinople, might be more advantageously situated in the Crimea, if a privilege to remove it could be obtained from the court of Russia, or if a free port were permanently established. In taking by this mart the silks of Brouse and of Persia, it would turn to the account of Russia herself. It is to be remarked, that the drugs which came from the confines of Persia, instead of being sent into Russia by Tifflis, and from thence to their destination, are embarked at the Persian Gulf, and afterwards return by the Baltic, after having made, as one may say, the tour of the world."

Under the present article, the Editor expected to have been able to communicate some new and interesting information respecting the commerce and antiquities of the Black Sea, from his friend Colonel Leon Waxell of St Petersburgh; but particular circumstances have prevented him from availing himself of the assistance of that able antiquarian, who travelled into the countries upon its shores in 1797 and 1798. In the mean time, this defect may be supplied by consulting his learned work, entitled, *Recueil de quelques antiquites trouvées sur les bords de la Mer Noire appartenans a' l'empire de Russie, dessines apres les originaux en* 1797 *et* 1798, *par* Leon de Waxell, Conseiller de Cour au service de S. M. J. de toutes les Russies, et Correspondant de l'Academie; Berlin, 1803. See also Herodotus, *Melp.* 4, 85, 86. *Strabo*, lib. i. Barbie du Bocage *Analyse de la Carte des marches et de l'empire d'Alexandre*, p. 801. Olivier's *Voyage, &c.* tom. i. p. 69. and Atlas, plate ii. Tournefort's *Voyage au Levant*, tom. ii. p. 124, 125. Buffon, *Hist. Nat.* tom. ix. Pallas' *Travels.* Dureau-de-Lamalle, *Geographie Physique de la Mer Noire, &c.* Paris, 1807, chap. xxvi. xxxi. xxxvi. Reuilly's *Travels in the Crimea, and along the Shores of the Black Sea*, chap. xi. Clarke's *Travels in different countries in Europe, Asia, and Africa*, tom. i. p. 643, 672.; Appendix, p. 711. See Caspian, Constantinople, Crimea, Russia, and Turkey. (h)

BLACKBURN, a town of England in Lancashire, situated upon the river Derwent, in a valley encircled with hills, and deriving its name from the blackness of the water in the Derwent. The town consists of several streets, and contains no remarkable buildings, except four stone bridges over the river. A very considerable trade is carried on here, in cotton, calicoes, and muslin, and in a kind of stuff called Blackburn gray, which is linen shot with cotton. Blackburn now communicates by canals with the rivers Dee, Mersey, Ribble, Ouse, Trent, Severn, Humber, Thames, and Avon; and, from this circumstance, its trade has considerably increased. Coal and alum are found in the neighbourhood. Number of houses, in 1801, 2332. Population 11,980; of whom 6800 were returned as employed in trade and manufacures. See Aikins' *Description of the Country from Thirty to Forty Miles round Manchester*, 4to, 1795. See also Lancashire. (π)

BLACKBURNE, Francis, a name which will ever be revered by the friends of religious liberty. He was born at Richmond, in Yorkshire, on the 9th of June 1705. On the banks of the river Swale, in that vicinity, his ancestors had been in possession of an estate, which his grandfather was under the necessity of selling; and, afterwards engaging in the stocking manufacture at Richmond, he was enabled to leave his son in flourishing circumstances. The latter died at an early age, and left two sons and a daughter. Francis Blackburne, the eldest of these sons, received his grammatical education at the schools of Hawkshead in Lancashire, and Sedbergh in Yorkshire, In 1722 he was admitted a pensioner of Catharine Hall, Cambridge, where he took the degree of bachelor of arts. He was afterwards elected conduct, or chaplain-fellow; and, on this title, obtained deacon's orders in 1728. It was not till 1739 that he received priest's orders, previously to his induction to the rectory of his native town. This living he obtained through the interest of Sir Congers d'Arcy, and John York, Esq. the representatives of that borough. For some time he was titular chaplain to Dr Matthew Hutton, archbishop of York; who collated him in 1750 to the archdeaconry of Cleveland, and to the prebend of Bilton. These are the only church preferments which he enjoyed; and the aggregate of his emoluments did not amount to £200 per annum. From the period of his settlement at Richmond, he applied himself, with great earnestness, to his parochial duties; and he became in every respect an exemplary minister. His first appearance as an author was in 1742, when he printed an assise sermon preached at York. His strenuous defence of Christian liberty he commenced in the year 1750, by publishing *An Apology for the Authors of a Book, entitled Free and Candid Disquisitions relating to the Church of England.* It was generally supposed, that, in the composition of that book, he had some share; but this he solemnly denied. In 1756 he engaged in the controversy respecting the intermediate state of souls. This subject had been discussed in a very learned and curious treatise of Dr Thomas Burnet; and it still occupied the attention of theologians. Mr Blackburne's earliest treatise on this topic, is entitled *No Proof in the Scriptures of an Intermediate State of Happiness or Misery between Death and the Resurrection: in answer to Mr Goddard's Sermon.* He published several other tracts on the same subject; and concluded his labours in 1765, with *A Short Historical View of the Controversy concerning the Intermediate State, deduced from the beginning of the Protestant Reformation to the present time: with a prefatory Discourse on the Use and Importance of Theological Controversy.*" An edition of this work, with large additions, was published in 1772.

In these productions he displays a large fund of theological learning, and much force of reasoning;

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but they are not the productions which have chiefly endeared his name to an enlightened posterity. His first publication on the subject of subscription to articles of faith, is entitled, *Remarks on the Rev. Dr Powell's Sermon, in Defence of Subscriptions, preached before the University of Cambridge on the Commencement Sunday*, 1757. These remarks, which made their appearance in 1758, may be considered as preliminary to that masterly production which forms the basis of his reputation, *The Confessional; or, a Full and Free Inquiry into the Right, Utility, Edification, and Success, of establishing Systematical Confessions of Faith and Doctrine in Protestant Churches*. Lond. 1766, 8vo. This production, which, like the rest of his controversial works, appeared without the author's name, excited no ordinary degree of attention; and its publication was succeeded by that of a multitude of polemical tracts. No satisfactory answer, however, has yet been produced; and, we may venture to affirm, that his fundamental principles are such as nothing but mere prejudice or sophistry will ever attempt to explode. Blackburne repelled some of the attacks which were made on his truly liberal and excellent performance. In 1770, he published a third edition, with corrections and large additions. This work, in its state of final improvement, we earnestly recommend to the serious consideration of every man of learning and sincerity.

It was natural to suppose, that, in his connection with a church which spreads so many snares for the consciences of its ministers, the author of *The Confessional* might experience some secret uneasiness; and, in consequence of such an impression, and of the archdeacon's high character, some leading members of the dissenting congregation in the Old Jewry, London, authorised one of his friends, on the death of Dr Chandler in 1766, to ascertain whether he was inclined to accept the situation of pastor to that society. This invitation he, however, declined, for reasons which have not been made public, but which appeared satisfactory to the applicants. Although he disapproved of some of the forms and doctrines of the established church, yet he is said to have preferred it on the whole to any other religious society; and, as his attack had been chiefly directed against its injunction of subscription to articles of faith, expressed in unscriptural language, he might think his consistency sufficiently maintained, by a refusal of any further preferment which required a renewal of subscription. In this honourable resolution he steadily persevered, when, in the year 1763, the living of Middleton-Fyas near Richmond became vacant, and the Lord Chancellor Northington was ready to bestow it upon him, in consequence of a promise which had been obtained by some of his friends. This living was tenable with his other preferments, and in value exceeded them all.

In 1768, Archdeacon Blackburne published *Considerations on the present State of the Controversy between the Protestants and Papists of Great Britain and Ireland, particularly on the question, how far the latter are entitled to toleration on Protestant principles*." His zeal against Popery manifests itself in most of the works which he produced; and it is certainly to be regretted, that, with all his benevolence and liberality, he should have been too much disposed to assimilate the Catholics of his own with those of a very different age. It is, however, to be remarked, that Blackburne resided in a part of the country where they were numerous and powerful; and that he had witnessed some imprudent displays of their spirit, at a time when their hopes were animated by the first events of the rebellion in 1745.

Blackburne published many other tracts on theological subjects; and, as he was always distinguished for the faithful discharge of his clerical duties, his life must have been spent in complete activity. For the first twenty years of his ministry, he composed a new discourse whenever he officiated. His archdeaconal visitations he endeavoured to render as useful as possible, by plain and serious charges, delivered with dignified earnestness; and his annual appearance generally attracted a large and respectable auditory. In the year 1767, he accepted the office of commissioner to the commissary of the archdeaconry; by virtue of which he presided in the spiritual court at Richmond. By his integrity and knowledge, he restored to this court a respectability not always attached to the ecclesiastical jurisdiction of his country; and his merits were very handsomely recognized by Mr Eden, now Lord Auckland, on his appointment to the commissariat. As the ecclesiastical law had not previously formed a part of his study, it has been mentioned as a proof of the vigour of his understanding, that he should make such proficiency in it as to pronounce decisions which were seldom, if ever, reversed, on appeals to a higher court.

At an advanced period of life, he formed the plan of writing copious memoirs of Martin Luther; but when he had proceeded so far as to collect a considerable mass of materials, he relinquished his undertaking in order to commemorate the patriotism and philanthropy of a deceased friend. On the death of Thomas Hollis, he was induced by Mr Brand Hollis, the friend and heir of that gentleman, to compile an account of his life. The *Memoirs of Thomas Hollis, Esq.*, which were printed at London in 4to, in the year 1780, are usually bound in two volumes, but have only one series of pages. The book was not originally published; but, after the death of Mr Brand Hollis, some copies have come into the market, and are sold at a high price. Thomas Hollis was an English gentleman of considerable fortune, somewhat eccentric perhaps in his character, but distinguished by an ardent spirit of philanthropy. He did not himself aspire to the fame of authorship; but he was liberally anxious to promote every literary scheme of a laudable tendency; and, in particular, he expended considerable sums in reprinting some of the earlier English writers on politics. Blackburne's *Memoirs of his Life* form a very curious and entertaining production; and every page breathes the manly and liberal spirit of a genuine Whig. A portion of this work was published in a separate form, under the title of *Remarks on Johnson's Life of Milton*. Lond. 1780, small 8vo.

Blackburne was equally attached to the principles of civil and of religious freedom. He wrote several short pieces in favour of political liberty, which were inserted in the public prints; and was a large contributor to a collection of letters and essays on this subject, published in 1774, in 3 vols. 8vo. He also appears as a correspondent in the excellent Mr Wyvill's *Political Papers*, vol. iii. p. 133.

When we recollect that the memoirs of Mr Hollis were finished in the 75th year of the author's age, the vigour of his mind will not fail to excite some degree of surprise; but the death of his second son Thomas, a physician of rising eminence in the city of Durham, affected him so severely as to relax his ardour for all literary pursuits. His sight soon afterwards began to fail, and he was obliged to employ an amanuensis. The increasing infirmities of age did not, however, prevent him from performing the duties of his profession; and it was on a visitation circuit that he was seized with his last illness. He died at the parsonage house of Richmond on the 7th of August 1787, after he had completed the 82d year of his age. "Mr Blackburne," says Dr Aikin, "was of an athletic make, and by constant temperance preserved great firmness of mind and body to the very last. His recluse mode of life gave him the appearance of much austerity; but, with the few friends with whom he associated, he was cheerful and unreserved. In mixed conversation he never introduced his own speculative opinions, and experience had made him wary of answering any interrogatories on the subject." The same respectable author remarks, that his theological opinions did not so far deviate from those of the church of England as to throw him into the class of Socinians or Unitarians. He declared himself in confidence to be a moderate Calvinist; and such a declaration might indeed have been anticipated from various passages in his writings. Some time before his death, he explicitly asserted to his relation, the Rev. Mr Comber, his belief in the divinity of Christ. It has been considered as a testimony of his general esteem for the established church, that he educated one of his sons for the clerical office.

The works of Blackburne are generally of an excellent tendency, and are always distinguished by their intelligence and vivacity. Few writers have discussed topics of theological controversy with equal decency and animation, and in a manner so entertaining to the general reader. See Dr Aikin's *General Biography*, vol. ii. p. 173. (*e*)

BLACKBURNIA, a genus of plants of the class Tetrandria, and order Monogynia. See BOTANY. (*w*)

BLACKLOCK, the Rev. THOMAS, D.D. a poet and a minister of the established church of Scotland. He was born in the year 1721, at Annan, in the county of Dumfries, but was soon afterwards removed to the town of Dumfries, where he spent the greater part of his early years. Before he was six months old he lost his eye-sight in the small-pox. This misfortune, which threatened to render him incapable of useful exertion, and leave him a burden to his family, seems to have been really the foundation of his future eminence. Endowed by nature with a lively fancy and a retentive memory, and shut out from that intercourse with the external world which sight would have afforded him, his active mind was compelled to seek employment in the exercise of its own powers. In this he was assisted by the indulgent care of his father, an intelligent tradesman, who fostered the inclination he early showed for books, by reading for his amusement whenever the intervals of business would permit, and by directing his taste to the best authors that lay within his reach. Though in his early years his father's limited circumstances did not permit him to enjoy the advantage of being educated at a grammar school, yet, by the assistance of his companions, whom the gentleness of his dispositions had warmly attached to him, he acquired some knowledge of the Latin tongue. The information thus obtained, the very circumstance of his blindness gave him an opportunity to impress more forcibly on his mind, by depriving him of the common means of relaxation. This may in some measure account for the remarkable progress which with such slender opportunities he made in his studies. Even at the early age of twelve, his poetical attempts, one of which is preserved in his poems, gave the promise of future excellence; and from that period he found in the cultivation of the muses, a delightful employment for the powers of his mind, and a protection from that *tedium*, to which the situation of the blind, when endued with sensibility, peculiarly subjects them. Before he had reached his twentieth year, he was fortunate enough to acquire a new and advantageous connection, by the marriage of his sister. This young woman, who possessed from nature, together with a very lovely person and attractive manners, all the innocent simplicity and gentleness of heart which characterised her domestic circle, had received from paternal indulgence an education superior to her station, and had begun to contribute her share to the support of the family expenses by her skill in needle-work, when she became known to Mr M'Murdo, the son of a distinguished clergyman in that neighbourhood. This gentleman, who had a short time before successfully commenced business as a brewer in Dumfries, and who joined to the most fascinating manners an enlightened and accomplished mind, having, on a further acquaintance, discovered that Miss Blacklock's virtues were not inferior to her personal charms, made her his wife, and thus opened to young Blacklock an intercourse with a more polished society than he had hitherto been accustomed to. An event in itself so fortunate, was rendered still more opportune by the shock which he was destined a short time afterwards to receive from the sudden and accidental death of his father. A fire having broken out in Mr M'Murdo's brewery, the good old man fell a victim to the boldness of his efforts in saving his son-in-law's property, and perished in the midst of the flames. This melancholy occurrence Blacklock pathetically laments in a poem written soon afterwards, which is strongly descriptive of the state of his feelings, and places his character in a very interesting point of view. It is entitled, *A Soliloquy*, and was occasioned by the following circumstance: During his father's life, the affectionate attentions of parental love had not suffered him to go out of doors without a guide, and by an amiable but injudicious tenderness had fostered his natural timidity, leaving him constantly dependant on the good offices of others for the power of moving even to a trifling distance. The death of his father, however, subjected him to many privations; and he now found it necessary to make exertions to which he had formerly been unaccustomed. When he, at any time, was induced to go from home alone, he had a favourite dog, which was his constant companion, and served to alleviate the forlorn and solitary feeling which his present condition inspired. Having one day wandered from the door, he lost his way, and was on the point of stepping into a draw-well of considerable depth, covered carelessly with rotten boards, where he must have been irrecoverably lost, had not his little attendant, by the sound of its feet on the cover, warned him of his danger. This accident forcibly called to his mind all the miseries of his helpless situation, and gave rise to a production, which, for pathos, tenderness, and sublimity, rivals the most happy efforts of the British muse. The piety and resignation to the will of heaven so beautifully expressed in the concluding part of this poem, and which formed a striking trait in his character, did not pass unrewarded. He remained with his mother for about a year after his father's death, and began to be distinguished, even beyond the circle of his own immediate friends and acquaintances, as a young man of uncommon parts and genius. At the end of this period, Dr Stevenson, an eminent physician in Edinburgh, being accidentally at Dumfries, became acquainted with young Blacklock's talents, and formed the benevolent design of giving to his natural abilities the advantage of a liberal education. Under this respectable patron, he commenced his studies at the grammar school of Edinburgh in the year 1741, where he continued till the breaking out of the rebellion in 1745. During this period, he was introduced to Mr Alexander, the lord provost of the city, a gentleman who was connected with Mr M'Murdo in some commercial speculations. In this family he had an opportunity of making himself master of the French language, which was the vernacular tongue of Mrs Alexander. Before leaving the metropolis, he became an author, by publishing a volume of poems in octavo. Soon afterwards he retired to Dumfries, where he resided during the national disturbances of that period in the house of his brother-in-law Mr M'Murdo. Dumfries was at this period fortunate in being the residence of several enlightened and ingenious men, in whose society Blacklock had an opportunity of tasting the charms of friendship, of improving his acquaintance with the world, and of considerably increasing the store of his ideas. Amongst these, besides the circle of this amiable family, in which he was an inmate, it may be proper to mention Mr Jameson, the episcopal clergyman, a worthy and ingenious man, with whom he contracted an intimate friendship; collector Gordon of Halbeths, himself a poet, who afterwards wrote an account of his life; and Mr Carlyle of Drungans, a gentleman who was bred to the law, but whose acquirements extended far beyond the limits of his profession. On the restoration of public tranquillity, Blacklock returned to the metropolis, where he continued his studies for six years longer. In the year 1754, a second edition of his poems in octavo was published at Edinburgh, and two years afterwards, a quarto edition came out by subscription in London. In the publication of the London edition, the celebrated David Hume, and Mr Spence, professor of poetry at Oxford, took a warm and active interest. This latter gentleman prefixed to that edition a very elaborate and ingenious account of Blacklock's life, character, and writings, which he had published separately two years before.

After going through the usual course of studies at the university with more than common success, he was in the year 1759 licensed by the presbytery of Dumfries to preach the gospel, and in this capacity soon obtained a high reputation. In 1762, he married Miss Sarah Johnston, daughter of an eminent surgeon in Dumfries; a connection which Providence seems to have intended as the solace and blessing of his future life. A few days after this event, he was ordained minister at Kirkcudbright, in consequence of a crown presentation obtained for him by the Earl of Selkirk, a benevolent nobleman, who took an interest in his welfare. Besides the natural prejudices of the people against a pastor deprived of sight, there were some other circumstances which combined to render his ordination unpopular amongst the inhabitants of the parish. At that period the disputes concerning patronage ran high throughout the kingdom; and the aversion of the lower classes to the exercise of that right, frequently, as in the present instance, prejudiced them against the presentee. Besides, it was known that the living had been bestowed on Blacklock through the interest of Lord Selkirk, with whom the town's people were at that period unfortunately involved in some political animosities, which made them look on his interference with a jealous eye. Add to all this, that the poet's language and style of preaching, though in themselves extremely good, and well adapted to the taste of an enlightened congregation, were too refined and philosophical to be relished, or perhaps understood, by that description of people of which his hearers were chiefly composed. It will not appear surprising, therefore, that much dissatisfaction should have prevailed at his nomination to that living; and those who are acquainted with the habits and feelings of the Scottish peasantry, will easily conceive the violent lengths to which such a combination of irritating circumstances would naturally lead them. The fact is, that he entered the town amidst the hisses and hootings of the populace; that his passage to the church, where the ceremony of ordination was to be performed, was obstructed; and that it was not without imminent danger to the persons of himself and his friends, that a way was made for him through the enraged crowd. The lively sensibility of Blacklock's mind was deeply wounded by this undeserved hostility, and the scenes of happiness which his benevolent heart and ardent imagination had pictured to him in the discharge of his clerical duties, vanished from his view. Instead of finding himself, as he had fondly hoped, installed in an office, every duty of which was to be a labour of love, he saw nothing before him but unavailing wishes, thankless toils, and endless contentions. After dining with some friends who had accompanied him from Dumfries, finding rest necessary to recruit his harassed and exhausted spirits, he left the table and retired to bed, when the following extraordinary circumstance occured, which merits particular notice as a curious fact relative to the state of the mind in sleep. One of his companions, uneasy at his absence from the company, went into his bed-room a few hours afterwards, and, finding him, as he supposed, awake, prevailed upon him to return into the dining room. When he entered the room, two of his acquaintances were engaged in singing, and he joined in the concert, modulating his voice as usual with taste and elegance, without missing a note or a syllable; and after the words of the song were ended, he continued to sing, adding an *extempore* verse, which appeared to the company full of beauty, and quite in the spirit of the original. He then went to supper, and drank a glass or two of wine. His friends, however, observed him to be occasionally absent and inattentive. By and bye he was heard speaking to himself, but in so slow and confused a manner as to be unintelligible. At last, being pretty forcibly roused by Mrs Blacklock, who began to be alarmed for his intellects, he awoke with a sudden start, unconscious of all that had happened, having been the whole time fast asleep. The principal part of these remarkable particulars, is mentioned by Dr Cleghorn in his Thesis *De Somno.* Where the writer of this article has ventured to make some additions to that account, he is supported by the testimony of Mrs Blacklock, from whom he personally obtained the anecdote.

Blacklock finding his situation in Kirkcudbright exceedingly irksome and painful, resigned his right to the living after a legal dispute of two years, and accepted of a moderate annuity in its stead. With this slender provision, he removed in 1764 to Edinburgh, where he adopted the plan of receiving a certain number of young gentlemen into his house as boarders. In this situation he continued with much success for 23 years, directing the studies of his boarders with the most affectionate care, and improving their minds by his enlightened conversation. "In the occupation which he thus exercised for so many years of his life," says the author of the Man of Feeling, in the elegant memoir he has prefixed to the posthumous edition of his poems, "no teacher was perhaps ever more agreeable to his pupils, nor master of a family to its inmates, than Blacklock. The gentleness of his manners, the benignity of his disposition, and that warm interest in the happiness of others, which led him so constantly to promote it, were qualities which could not fail to procure him the love and regard of the young people committed to his charge; while the society, which esteem and respect for his character and his genius often assembled at his house, afforded them an advantage rarely to be found in establishments of a similar kind." The writer of this account has frequently been a witness of the family scene at Dr Blacklock's; has seen the good man amidst the circle of his young friends, eager to do him all the little offices of kindness which he seemed so much to merit and to feel. In this society he seemed entirely to forget the privation of sight, and the melancholy which at other times it might produce. He entered with the chearful playfulness of a young man into all the sprightly narrative, the sportful fancy, the humourous jest, that rose around him. It was a sight highly gratifying to philanthropy, to see how much a mind endowed with knowledge, kindled by genius, and above all, lighted up with innocence and piety, like Blacklock's, could overcome the weight of its own calamity, and enjoy the content, the happiness, and the gaiety of others. Several of those inmates of Dr Blacklock's house, retained in future life all the warmth of that impression which his friendship at this early period had made upon them; and in various quarters of the world he had friends and correspondents, from whom no length of time, and no distance of place, had ever estranged him.

In 1766, upon the unsolicited recommendation of his friend Dr Beattie, the degree of doctor of divinity was conferred on him by the university of Aberdeen.

In 1787, finding that his time of life, and the state of his health, required repose, he was induced to discontinue the receiving of boarders. In the mean time, the infirmities of age were rapidly and visibly advancing. A constitutional lowness of spirits, to which, even in the vigour of youth, the delicate sensibility of his nerves had at times rendered him subject, began to recur more frequently, and with greater severity; and a general indisposition both of body and mind, indicated the near approach of that period beyond which protracted life is often little more than protracted pain. Amidst these indispositions of body, however, and disquietudes of mind, the gentleness of his temper never forsook him, and he felt all that resignation to the will of the Supreme Being, and confidence in his goodness, which, through every vicissitude of life, had habitually supported his mind. In summer 1791, he was seized with a feverish disorder, which on the 7th July, after about a week's illness, ended in his death.

The character of Blacklock, whether we consider the qualities of his heart, or the endowments of his understanding, is worthy of admiration. To an eager sensibility and quickness of feeling, which is the peculiar temperament of poetic genius, he joined an uncommon gentleness and candour of mind. His vigorous understanding, and his ardent pursuit of knowledge, were chastened and adorned by an amiable modesty, and an innocent simplicity of manners. Deprived of sight in early infancy, nature seems to have compensated for this misfortune, by opening to him many sources of enjoyment unknown to common minds. As he was debarred from those amusements and avocations which distract and embarrass the mental powers, he devoted himself to learning, and successfully cultivated the elegant pleasures of taste and fancy. Amidst disadvantages and discouragements which would have overwhelmed a more feeble mind, he was distinguished by his proficiency in classical literature, in belles lettres, in metaphysics, and in all the various branches of knowledge for which the age is distinguished. As a poet, his merit has been long known and acknowledged. The productions of his muse are marked with such an elegance of diction, such an ardour of sentiment, and such a glow and propriety of description, as must excite the approbation, and affect the feelings, of every reader of taste. What is particularly remarkable in the works of one

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deprived from his earliest infancy of the blessing of sight, is the accurate and beautiful descriptions of visible objects with which his writings abound. This circumstance has raised the astonishment of all who are capable of forming an opinion on the subject. Mr Spence, his elegant panegyrist, has treated this descriptive power in one labouring under such a deprivation, as a sort of problem, which, in a very ingenious but fanciful manner, he has endeavoured to explain. Professor Denina, an ingenious foreigner, in his *Discorso della Literatura*, has expressed himself on this subject in terms of admiration and surprise. "Blacklock," says he, "to posterity, will seem a fable; as to the present age, he is a prodigy. It will be thought a fiction, that a man blind from his infancy, besides having acquired a surprising knowledge of Greek, Latin, Italian, and French, should at the same time be a great poet; and, without having almost ever seen the light, should, notwithstanding, be singularly happy in his descriptions." Though we may not be inclined to subscribe to the theory which Mr Spence has adopted, or to ascribe to Blacklock any extraordinary or supernatural conception of visible objects, we may at least fairly claim for him a singular felicity of combination in his use of the expressions by which these objects are distinguished. A retentive memory, and an intimate acquaintance with poetical language, joined to an enthusiastic and creative fancy, which embodied all his ideas, may perhaps go far to account for a phenomenon which has exercised the talents of ingenious men both at home and abroad. With respect to the other qualifications of Blacklock as a poet, we do not hesitate to say, that he exhibits proofs of an ardent imagination, a refined taste, and a feeling heart. "One other praise," says Mr M'Kenzie, with no less truth than elegance, "which the good will value, belongs to those poems in a high degree,—they breathe the purest spirit of piety, virtue, and benevolence. These indeed are the muses of Blacklock; they inspire his poetry, as they animated his life; and he never approaches the sacred ground on which they dwell, without an expansion of mind and an elevation of language."

Besides the publications already mentioned, Blacklock was the author of several other works, which add to his fame as a poet the character of a profound philosopher and skilful theologian. In 1756, he published at Edinburgh, *An Essay towards Universal Etymology, or the Analysis of a Sentence*, 8vo. In 1760, he published, *The Right Improvement of Time*, a sermon, 8vo; and in the same year, he contributed several poetical pieces to the first volume of Donaldson's *Collection of Original Poems by Scots Gentlemen*, 12mo. In 1761, he published, *Faith, Hope, and Charity compared*, a sermon, 8vo. In 1767, he gave to the world his *Paraclesis; or Consolations deduced from Natural and Revealed Religion, in two Dissertations. The first supposed to have been written by Cicero, now rendered into English, the last originally composed by Thomas Blacklock, D.D.* In 1768, he published without his name, *Two Discourses on the Spirit and Evidences of Christianity, translated from the French of the Reverend James Armand, Minister of the Walloon Church in Hanau.* In 1773, he published a poem, entitled, *A Panegyric on Great Britain*, 8vo. In 1774, he published, *The Graham, an Heroic Ballad*, in four cantos, 4to. In 1793, a posthumous edition of his poems was published by Mr M'Kenzie. There are still unpublished some volumes of sermons in manuscript, together with a treatise on morals, both of which his friends have had it in contemplation to give to the world. See an account of Blacklock's life by Mr Gordon, prefixed to the edition of his poems published at Edinburgh in 1754; another by Mr Spence, prefixed to the edition of his poems published at London in 1756; another by Mr M'Kenzie, prefixed to the posthumous edition of his poems in 1793; and another by Dr Anderson, in his Lives of the Poets. (H. D.)

BLACKMORE, Sir RICHARD, was the son of Mr Robert Blackmore, attorney at law, and was born at Corsham, in Wiltshire, about the year 1650. He received the first elements of education in a country school; removed to Westminster in the 13th year of his age; and was sent to the university of Oxford in 1668, where he resided twelve or thirteen years without much apparent improvement in literary acquisitions. It is supposed, that, after leaving the university, he was engaged a short time in the profession of a schoolmaster; but it is better ascertained, that he travelled into Italy, and took the degree of doctor of medicine at the university of Padua. Having spent about a year and a half on the continent, during which period he visited France, Germany, and the Low Countries, he returned to London, where he commenced the practice of physic, and was chosen fellow of the Royal College of Physicians in 1687. His growing reputation in his profession, and his decided attachment to the principles of the revolution, recommended him so strongly to the notice of King William, that, in 1697, he was chosen one of his majesty's physicians in ordinary, and received, about the same time, the honour of knighthood, accompanied with the gift of a gold chain and medal. A few years before this exaltation, he had commenced his literary career, by the publication of *Prince Arthur*, a heroic poem, which was so favourably received, that it passed through three editions in the space of two years. He published, in 1697, a similar poem, entitled, *King Arthur*; in 1700, *A Paraphrase on the book of Job*; and, in the same year, a poem entitled, *A Satire upon Wit*, which was intended as a censure upon the licentious tendency of many of the productions in his time; in 1705, another heroic poem, entitled, *Eliza*; in 1712, a philosophical poem, the best of his productions, entitled, *Creation*; in 1714, a volume under the title of *The Lay Monastery*, consisting of forty numbers, which had appeared periodically in the preceding year; in 1716, *Essays upon several Subjects*, 2 vols. 8vo.; in 1718, *A Collection of Poems*, in one volume, 8vo.; in 1721, *The Redeemer*, a poem; in the same year, *A new Version of the Psalms of David*, which was recommended, by an order of council, as proper to be used in the churches and chapels of England; and a variety of other pieces, partly theological, but chiefly on medical subjects, such as the plague, small-pox, consumption, spleen, gout, rheumatism, king's evil, dropsy, tympany, jaundice, stone, and diabetes. He died on the 8th of October 1729, and manifested the most elevated piety during his last illness.

Few authors have been more severely satirised than Sir Richard Blackmore; and his name has been too readily associated, upon the authority of his enemies, with the essence of absurdity and dulness. He must be admitted, indeed, to have been justly obnoxious to ridicule, on account of his tedious historical epic poems; to have written too hastily and carelessly; to have been extremely negligent in correcting and polishing his compositions; and to have, in many instances, discovered extraordinary deficiency in point of true taste; but he was far from deserving that extreme contempt with which he has been treated, and was by no means destitute of ability, learning, or even of poetical genius. Some of his keenest opponents have acknowledged, that his poems possess a certain degree of merit, and deserve a considerable portion of applause; and many eminent literary characters, Mr Duncombe, Mr Addison, Mr Locke, Mr Molyneux, and Dr Watts, have spoken of his works, especially of his poem on *Creation*, in terms of high approbation. There is too good reason to believe, that it was his religion more than his dulness which excited much of the animosity which he sustained, and that he incurred such bitter attacks from his contemporaries chiefly by his censures of their immorality and profaneness. But, whatever becomes of his fame as an author, there can be no dispute on the subject of his personal character. He was always a most zealous advocate for the interests of religion and virtue; was distinguished by the fervent piety and moral excellency of his own life; and, while his numerous enemies were unable to attach the slightest moral stain to his memory, his acquaintances and friends have highly extolled his private virtues. See *Biog. Britan. Gen. Biog.* Johnson's *Lives of the Poets. Spectator*, No. 339. Watt's *Horæ Lyricæ, Preface.* Locke's *Works*, vol. iii. p. 568. Duncombe's *Coll. of Letters*, vol. i. p. 121. &c. (*q*)

BLACKSTONE, Sir William, an English lawyer of great celebrity, was born at London on the 10th of July 1723. He was the third son of Charles Blackstone, a silk mercer; but, being left an orphan, the charge of his education was generously undertaken by his maternal uncle, Thomas Biggs, a surgeon in London. At an early age he was sent to the Charter-house school, and was some years afterwards admitted a scholar on the foundation. In November 1738, he was entered at Pembroke College, Oxford. At both these seminaries he distinguished himself by his proficiency in classical learning. His attainments do not, however, seem to have been circumscribed by the ordinary limits of academical discipline: At the age of twenty, he composed, for his own use, an elementary treatise on architecture, which was never published, but which is said to possess great merit. Having determined to embrace the profession of the law, he entered himself of the Middle Temple; and, in 1744, he quitted Oxford, and those classical pursuits which were so congenial to his taste. This transition, to studies of a less pleasing nature, he very feelingly commemorated in an elegant poem, entitled, *The Lawyer's Farewell to his Muse*, which was afterwards printed in the 4th volume of Dodsley's collection, and which is allowed to display a very early maturity of taste and judgment. He now applied himself with great assiduity to the studies of his profession; dividing his residence between the Temple, and the university, a place to which he always retained his youthful attachment. He had been elected a fellow of All-souls College in 1743; and, on the 28th of November 1746, he was called to the bar. As he was very deficient in elocution, and possessed none of the popular talents of an advocate, his progress in the profession was extremely slow; and, being without any avocations of business, the active turn of his mind displayed itself in the office of bursar, or steward, of All-souls. In this situation he is said to have merited great praise for his skill and diligence in arranging the records and improving the revenues of the college, and in expediting the necessary measures for completing the magnificent structure of the Codrington library. In 1749, he was appointed, through the interest of a relation, recorder of Wallingford in Berkshire; and, in the following year, probably with a view to more constant residence at Oxford, he took the degree of doctor of laws.

After Blackstone had attended the courts at Westminster for a period of seven years, his prospect of success was so extremely precarious, that he determined to quit the regular practice of his profession, and retire to his fellowship. To this determination he was indebted for the future distinctions of his life. "The system of education in the English universities," says a very intelligent biographer, "having been established in remote ages, and intended solely for the instruction of the Popish clergy, was without any public provision for teaching the laws and constitution of their own country; and, from that mixture of pride and indolence, which is the characteristic of ancient and wealthy establishments, the defect was suffered to continue after the universities had ceased to be appropriated to ecclesiastics, and had become places of general education. This defect Mr Blackstone now undertook to supply by a course of public lectures on that important subject; and the manner in which he executed the task, has conferred great and lasting distinction on the university in which his lectures were delivered. It is indeed a singular circumstance, and may be of some use in enabling us to appreciate the merit of our academical establishments, that, in the long succession of public teachers and professors, during a period of several centuries, the Commentaries of Blackstone, and the Hebrew Prelections of Lowth, are the only series of lectures in either university which have any prospect of descending to posterity, or of acquiring a permanent place in the literature of their country."

Blackstone commenced his first course of lectures in Michaelmas term 1753; and they continued to be repeated, during a series of years, with great and increasing reputation. It was probably the success of this attempt, that suggested to Mr Viner the plan of endowing, by his will, a liberal establishment in the university of Oxford for the study of the municipal law. In October 1758, Dr Blackstone

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add, with great success; for, if their chastisement did not extort a candid acknowledgment of his errors, it at least produced a silent retrenchment, in the subsequent editions, of the more obnoxious passages. His political principles were still more severely exposed, in an acute production entitled *A Fragment on Government, written by* Jeremy Bentham, Esq. It has been mentioned, to the honour of Blackstone, that, notwithstanding the severity of this criticism, he, some years afterwards, became acquainted with the author, and lived with him on terms of friendship and regard.

He was likewise involved in a controversy respecting the famous case of the Middlesex election. In the House of Commons, he gave it as his opinion, that an expelled member was not eligible to the same parliament; and this doctrine appearing to contradict the language of his Commentaries, he was keenly exposed for his inconsistency by the celebrated Junius, and by other writers of inferior distinction. On this occasion he certainly defended himself with great ingenuity: but his subsequent conduct added considerable weight to the charge which had been preferred against him; for, in the next edition of his work, he inserted the case of expulsion, of which no previous notice had been taken, among the disqualifications to sit in parliament.

Blackstone's real merits, and, what is generally of greater consequence, his servile devotion to the ministry, were not suffered to pass unrewarded. On the resignation of Mr Dunning in 1770, he was offered the situation of solicitor general, which naturally leads to the highest offices of the law; and, on his declining it, he was appointed one of the justices of the court of common pleas. In this honourable and tranquil station he continued till the time of his death, which happened, in consequence of a dropsy, on the 14th of February 1780. His health, which had been considerably impaired by the labours of his early years, by an unfortunate aversion from exercise, and perhaps by some habits of excess, had been declining for some time; but it had begun seriously to fail towards the latter end of the preceding year.

The private character of Blackstone seems to have been highly estimable for mildness, benevolence, and every social and domestic virtue. A love of business, and useful employment, was one of the ruling passions of his life; and the leisure which he enjoyed during his latter years, was devoted to schemes of social improvement in the neighbourhood where he resided, or to great public undertakings. He left, in manuscript, two volumes of reports, which have been published since his death, but without adding much to his reputation as a lawyer. See *Life of Blackstone*, prefixed to his *Reports*; and Aikin's *General Biography*, vol. ii. p. 177. (*e*)

BLACKWELL, Thomas, was born in Aberdeen in the year 1701, and was the son of the Rev. Thomas Blackwell, one of the ministers, and principal of Marischal College in that city. He received his grammatical and university education in his native place, and took the degree of master of arts in the seventeenth year of his age. In the year 1723, he was appointed professor of Greek in the Marischal College, of which he was also made principal in the year 1748; and is the only layman who has been advanced to that office since the patronage fell to the crown, by the forfeiture of the Marischal family in 1716. He still retained his Greek class, which he continued to teach with great assiduity and success till within a few years of his death; and in 1752 he received the degree of doctor of laws. In the latter part of his life he was afflicted with a consumptive disorder, which he is supposed to have greatly aggravated by his obstinate perseverance in excessive abstemiousness. It was recommended to him to travel for the benefit of his health, and, in February 1757, he set out from Aberdeen for that purpose; but he was unable to proceed farther than the city of Edinburgh, where he died in March following, in the 56th year of his age. Dr Blackwell's literary productions were, *An Inquiry into the Life and Writings of Homer*, published in 1735; a work of little method, but of great ingenuity and learning;—*A Key to the Inquiry*, published in 1736, containing a translation of the numerous Greek, Latin, Spanish, Italian, and French notes in the original work;—*Letters concerning Mythology*, published in 1748; a very miscellaneous and desultory composition, but full of erudition and fancy, and containing a variety of interesting details;—*Memoirs of the Court of Augustus*, of which the first volume appeared in 1753, the second in 1755, and the third, which was posthumous and incomplete, in 1764; a book which is written with great parade of language and peculiarity of style, but which contains an immense fund of curious information. In all the productions of Dr Blackwell, there is a very considerable dash of pedantry and affectation, which gradually increased with his years; but it is a pedantry of a very peculiar description, and is an attempt at once to display the erudition of a scholar, and to write with the polite ease of a gentleman. He was well acquainted with all the ancient, and with most of the modern languages, and had also read very extensively in the departments of history and the belles lettres; but he was too much inclined to assume the appearance of universal knowledge, and frequently exposed himself by attempting discussions in philosophy and mathematics, in which his attainments were very defective. He discharged his duties as a public teacher with great diligence, and merited applause. He commanded the attention of his students by the dignity of his address; enforced application by a steady exaction of the prescribed exercises; excited an ardour of study by his own enthusiasm for the beauties of the ancients; communicated much accurate classical learning by his perspicuous and engaging manner of teaching; diffused particularly a keener relish for Grecian erudition; and may justly be regarded as having principally contributed to the future eminence of such men as Campbell, Gerard, Reid, Beattie, Duncan, and the two Fordyces. He possessed an equable flow of spirits, an entire command of his passions, a great fund of good humour, and a considerable degree of ease and politeness in his manners. In his private life he was studious and retired, seldom entering into mixed companies, and choosing the conversation chiefly of men of learning and of superior rank to himself. He was [illegible] he was proposed as a candidate. But though his competitor in the canvass was Mr Robert Walker, a man of high estimation for his learning and popular eloquence, who was supported by a powerful and a united party, yet with circumstances honourable to his character, he obtained a decided majority, and was accordingly translated to a situation where a greater field was opened to his talents. In this station he remained with a growing reputation for the period of eleven years, constantly devoting himself to the duties of his office and carefully attending to every circumstance which might improve his compositions and render them more worthy of the applause they so liberally received. This laudable industry soon met with the reward which it merited. His pure native taste easily rejected the youthful ornaments with which his earlier productions were loaded, and his style, whilst it lost nothing of its original warmth and energy, assumed a peculiar chasteness and propriety that discovered the hand of a master. His success as a preacher, indeed, depended almost entirely on the intrinsic merit of his discourses, and owed nothing to the charm of delivery, which so wonderfully embellishes even moderate talents, and gives such a fictitious value to the sentiments of a public speaker. Though his manner was serious, his voice was weak and unmusical, and his pronunciation, which was by no means remarkable for its correctness, was marred by a burr, or indistinct articulation of the letter R. Notwithstanding these unfavourable circumstances, however, the superiority of his abilities was universally acknowledged, and paved the way to him for higher preferments. In 1754, he received a call from the town council of Edinburgh, and was, on the 11th October, translated from the Canongate to Lady Yester's Church in the city. Whilst he remained in this charge, the University of St Andrew's paid a very flattering tribute to his talents, by conferring on him the degree of D.D. a literary honour which was at that time of some value in Scotland. During this period, too, he found sufficient leisure, from the laborious duties of his profession, to turn part of his attention to subjects of general literature, and, in conjunction with some of the ablest men in the kingdom, to conduct for a short time a periodical work of great merit, entitled *The Edinburgh Review*. In this work Dr Blair had an opportunity of shewing the extent and accuracy of his critical *acumen*, by a review of several contemporary productions, and particularly of Dr Hutcheson's ingenious system of moral philosophy.

A farther advancement was yet in reserve for Dr Blair,—the highest and most honourable to which, in the line of his profession, a clergyman of the Church of Scotland can aspire. On the 15th June 1758, he was promoted to the High Church of Edinburgh, at the express request of the lords of council and session, and of the other distinguished characters who, from their official situation, attended divine service in that church.

Having now, by unwearied application, laid in a stock of sermons sufficient to relieve him from the weekly drudgery of preparation for the pulpit, he began to think seriously of teaching to others that art which had contributed so materially to the advancement of his own reputation. With this view he prepared a course of lectures on composition, and being encouraged by his friends, he, with the approbation of the university, began to read them in the college, on 11th December 1759. To this undertaking he brought all the qualifications requisite for executing it well; and, along with them, a weight of reputation which could not fail to give effect to the lessons he should teach. Accordingly his first course of lectures was received with great applause; and in the following summer, on the application of the patrons of the university, his majesty erected and endowed a professorship of rhetoric and belles lettres, and appointed Dr Blair, "in consideration of his approved qualifications, regius professor thereof, with a salary of £70." These lectures, which were published when declining health induced him to retire from the labours of the office, do honour to the taste and judgment of the author.

About this period, Mr M'Pherson, by the persuasion and under the patronage of Dr Blair and Mr John Home, undertook a tour through the Highlands, and collected the materials of those admirable poems which bear the name of Ossian. On the publication of this literary phenomenon, the opinion of the public was much divided, both with regard to its intrinsic merit and its authenticity. Dr Blair entertained for it the partiality of a protector and guardian; and being in possession of information sufficient to convince him that it was no imposture, he determined to give to it all the sanctity of his authority. With this view, he published a dissertation on these poems, which, in beauty of language, elegance of taste, and accuracy of critical discrimination, is not unworthy of his high reputation.

Dr Blair now began to take a warm and decided, though not very public, part in the politics of the church. In this department of his clerical duty, he espoused the cause of that party to which the eminent abilities and popular eloquence of Dr Robertson had given consistency and strength, and which was distinguished at that period not less by the character than the name of moderation. The leading principle which directed all the measures of Dr Robertson and his friends, was to preserve the church, on the one side, from a slavish, corrupting dependence on the civil power; and, on the other, from a greater infusion of democratical influence than is compatible with good order, and the established constitution of the country. The Church of Scotland still smarted under the wounds inflicted upon it by the persecuting spirit of the last of the Stuart race, and, on this account, a majority of the lower orders, and many of the clergy, still cherished the spirit of their forefathers, though no longer required by the exigency of the times, and entertained an inordinate jealousy of persons in power. Against these prejudices this profound politician successfully exerted his talents, and in this laudable undertaking he was cordially supported by his colleague Dr Blair; but these excellent men do not seem to have been sufficiently aware of the insinuating nature of civil authority, and in their zeal to repress faction and turbulence, perhaps with too rash and indiscreet a hand, That we may be able to form a more accurate idea of Dr Blair's merit as a preacher, and of the difficulties with which he had to contend, it may be proper shortly to advert to the state in which he found the eloquence of the Scottish pulpit. The reformation, which, in the sister kingdom, had been conducted with caution and timidity, under the immediate sanction and by the interference of the civil power, was in Scotland occasioned by the spontaneous impulse of public sentiment, which, with ungovernable fury, burst through every barrier opposed to it by the efforts of despotic power. It thus acquired, in its infancy, a character of harshness and enthusiasm which subsequent events tended to confirm. The bloody persecutions under Charles II. and his unfortunate and ill-advised brother, kindled afresh the dying embers of fanaticism, and, by a consequence extremely natural, cherished in the minds of the people an undue value for those religious dogmas and forms of ecclesiastical jurisdiction for which they suffered. These circumstances, whilst they roused a spirit in the kingdom which the revolution of a century was not able to subdue, infused, at the same time, a peculiar tone of wildness and untutored vehemence into the eloquence of the public teachers. When Blair first commenced his clerical labours, one class of preachers still adhered to that wild, unseemly, and incoherent mode of declamation, which had been originally introduced by the early reformers, to inflame the imagination and rouse the passions of their rude and ignorant hearers. In their manner of delivery they were warm and violent; but their warmth had more the appearance of passion than of sentiment, and their violence approached nearer to the boisterous fury of the zealot than to the manly indignation of a generous and enlightened mind. With respect to the matter of their discourses, the range of their ideas was exceedingly circumscribed. The peculiar doctrines of the gospel were almost the only subjects on which they ventured to address their hearers; and these they usually treated in the same desultory manner, and enforced with the same hackneyed arguments. They delighted to confound by mystery, or overwhelm by terror, rather than to instruct by accurate reasoning, or edify by practical induction. This irrational and injudicious mode of instruction, adopted by the preachers of the old revolutionary school, gave rise, by a kind of repulsion, to an opposite class, who, despising the arts by which their brethren rose to fame, and aspiring after the approbation of more cultivated minds, fell too frequently into another extreme. In avoiding the awkward gestures, and untunable vociferation, which disgusted the well educated hearer, they usually delivered their discourses with the immoveable rigidity of a statue, and the tiresome monotony of a schoolboy. In adopting a more extensive field for public discussion, they often receded too far from the beaten track, and substituted for the doctrines and the precepts of the gospel a dry metaphysical dissertation, which few of their hearers could follow, or an elegant moral harangue, the reasonings and motives of which, not being drawn from the Christian system, were too affectedly refined to reach a common understanding, and too feeble to influence a common mind. This account of the eloquence of the Scottish pulpit, serves strongly to characterise the genius of the nation at that period, when a sour, uncharitable, and bigotted temper, accompanied by a contempt for human learning, began to give place to a chearful and enlightened piety, which introduced and fostered a predilection for polite literature, and a spirit of sober and rational discussion. The extremes, however, to which the two different classes of religious instructors carried their opposite peculiarities, served equally to bring into discredit the principles of genuine Christianity. Whilst the loose and enthusiastic rhapsodies of the one was a subject of ridicule to the sceptical and profane, the suspicious and lukewarm conduct of the other, in the total rejection, and the stinted and cautious use of scriptural doctrines, was to the sincere believer a ground of serious regret and well-founded alarm. Such however was, with some exceptions, the situation of the Church of Scotland, before Dr Blair commenced his public labours, and gave a more chaste, correct, and happy form, to the method of religious instruction in Scotland. This accomplished preacher seems, in many respects, to have hit that happy medium at which all pretended to aim, but which few had the good fortune to reach. Uniting the learning and elegance of the polite scholar with the tenderness, the warmth, and the energy of the Christian teacher, he has arrayed truth in her most lovely and venerable garb, and given to her form all the captivating influence of its native attractions. In the composition of his sermons, we discover the regular and well-digested plan of the logician joined to the splendid beauties of the orator; in his sentiments, we find the ingenious reasoning of the philosopher blended with the sublime and enlightened views of the Christian. If, however, the severe eye of criticism were disposed to examine the discourses of Dr Blair by the standard of perfection, it might perhaps be able to point out some deficiency in the execution of that part of his duty, which more peculiarly belonged to him as a preacher of the gospel. Scriptural doctrines do not always appear to have been illustrated by him with sufficient attention, nor scriptural motives to have obtained a place due to their importance; and too strong a bias may perhaps be observed, in his writings, in favour of moral discussions, abstracted from the consideration of the truths inculcated by revelation. See *A short account of Blair's Life and Writings, by Dr Finlayson, subjoined to the fifth volume of Blair's Sermons*; and a separate and more extended account, by Professor John Hill, LL.D. (E. B.)

BLAKE, Robert, a celebrated English admiral, was born in the month of August 1598. His father, Mr Humphry Blake, was a Spanish merchant, who had made a considerable fortune, and purchased a small estate in the neighbourhood of Bridgewater, where his family had long been settled. Robert was sent to a free school in that town, and afterwards removed to Oxford, where he prosecuted his studies for seven years, being a member, first of St Alban's Hall, and then of Wadham College. He took a degree before leaving the university; but was unsuccessful in the pursuit of academical preferment. During his residence there, he displayed that temper

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which afterwards became more conspicuous in his political conduct. Though a humourist, and, in that character, extremely agreeable to the jovial companions with whom he associated, his humour was strongly tinctured with sarcastic severity; and, while he pleased his friends by his chearfulness, he gratified his own censorious propensity, by attacking the pride of courtiers, and the arrogance of churchmen.

In the parliament which sat in April 1640, he took his place as a burgess for Bridgewater. This honour he owed to the Puritans, who promoted his views on account of his integrity, his dislike to persecution, and his strong leaning to the cause of liberty. But he had no opportunity then of shewing what talents he possessed as a senator; and in the long parliament which succeeded he lost his election.

When the civil war broke out, he declared for the parliament, and soon took arms in its support. As an officer, he displayed great military talents. He was employed on every occasion which particularly called for dexterity or courage; and recommended himself so much by his able and zealous services, that, in 1644, he was appointed governor of Taunton, in Somersetshire, a place which he had taken by surprise, and which was of the utmost consequence to the parliament, being the only garrison they possessed on that side of the island. Here he was besieged by General Goring, at the head of 10,000 men; but he, and his gallant handful of troops, made such an obstinate and successful resistance, that the parliament bestowed upon them a handsome pecuniary reward. While he held this honourable appointment, he shewed his devotedness to the cause which he had espoused, by joining in an address of thanks to the House of Commons, for resolving that no more addresses should be presented to the king. The last military achievement which he performed, was reducing Dunster castle, a seat belonging to the ancient family of Lutterel, from which the king's troops frequently sallied forth, to the great annoyance of the surrounding country.

Hitherto Blake had not signalised himself more than many others who were engaged in the same enterprise; but the time was now arrived, when he was to enter on a new scene of exertion, to stand alone and unrivalled in a most important branch of the public service, and to add fresh lustre to his own reputation and to that of his country. On the 12th of February 1649, he was appointed one of the commissioners of the navy; and a few days after, an act was passed, nominating him, in conjunction with Deane and Popham, who were likewise land officers, to the command of the fleet. With our ordinary ideas of naval duty, it seems a strange transition, to pass, without any professional preparation, from the colonelcy of a regiment, or the government of a town, to the difficult and important situation of an admiral, who must not only be acquainted with the mere act of fighting, but also with the practice of common navigation, and the principles of maritime tactics. Strange, however, as the transition appears, and unlikely to contribute to the advantage of the state, it succeeded so well in this case, that those who made it soon became more eminent than almost any who had preceded them, and acquired for themselves a name which will ever adorn the naval annals of the country. With regard to Blake, in particular, he seems to have been a man distinguished by that original force of mind, that natural quickness of apprehension and dexterity of powers, which enables the individual, by whom it is possessed, to acquire any species of knowledge with facility, and to apply it to practical purposes with wisdom and effect. There was, besides, in Blake, a peculiar energy of character, which, commanding respect as soon as it was observed, would soon reconcile those who were under him to his authority, induce them to overlook his want of technical science, and make them not only anxious to aid his endeavour in acquiring what he thus needed, but also willing to confide in his decisions, and ready to carry them into execution.

The first service which Blake performed after he took the command of the fleet, was delivering the coasts of Britain and Ireland from the depredations of Prince Rupert. This prince continued cruising in a piratical way, and making prizes throughout the greatest part of the year 1649. The parliament, as soon as affairs became more favourable to them in Ireland, gave orders to Blake and Popham to block up the prince's squadron in the harbour of Kinsale. This was done in the most effectual manner; and to such extremities was Rupert reduced, that his men began to desert in great numbers; which circumstance, along with the desperate state of the royal cause, made him resolve to force a passage through the parliament's fleet. He carried his resolution into effect with the loss of three ships, and made the best of his way to the coast of France, and from thence sailed towards the Mediterranean, obstructing and injuring the trade of England by a system of privateering, as dishonourable to him as it was hurtful to the trade of the commonwealth. Blake, having been sent after him, arrived at St Andero, from which place he wrote a letter to the king of Spain, requiring that such of Prince Rupert's ships and men as were in his power should be delivered up, and threatening vengeance in case of refusal. To this requisition, his catholic majesty returned a civil answer, and accompanied it with a ring worth £1500, as a mark of his respect for the admiral. Blake then followed Rupert into the Tagus, where he destroyed the Brazil fleet. The prince being, in consequence of this, forced out of the river, betook himself first to Carthagena, and then to Malaga, where Blake attacked him, and destroyed all his ships excepting two, which he himself and his brother Maurice commanded. This event is said to have occasioned considerable alarm in the different courts of Europe. But it produced the most sensible effect in those of Spain and Portugal, which immediately sent ambassadors into England to acknowledge the power of the parliament.

On his return home, Blake was cordially received by the Parliament, in whose cause he had made such gallant exertions. He was honoured with the thanks of the House; and as a farther expression of their gratitude to him for the past, and of their confidence in him for the future, they again conferred upon him, in conjunction with Deane and Popham, the supreme command of the fleet. In the course of the year 1561, he reduced the islands of Scilly, Jersey, and Guernsey, which had been held for the king, and which were extremely injurious to the country, on account of the great number of privateers that they harboured.

In the year 1562, war broke out with Holland, and Blake was constituted sole admiral. On the 18th of May he fell in with the Dutch fleet, commanded by Van Tromp. Though he had no more than 15 vessels to contend against 42, he not only did not decline an engagement, but actually gained a victory, capturing two of the enemy's squadron, and disabling a third; and, in consequence of a reinforcement of eight ships under Major Bourne, obliged them to consult their safety in flight.

In the beginning of July he sailed to the north, for the purpose of destroying the Dutch herring fishery, which he imagined would convince the States, more than many defeats, of the absurdity and danger of disputing with England, the sovereignty of the seas. He found the fishing vessels under the protection of 12 men of war. A stout battle took place with the convoy, which ended in the capture of the whole. The fishery of course was left entirely to Blake's mercy. He treated those who were engaged in it with great humanity, but at the same time in such a manner as to impress upon their minds a strong sense of the maritime power and greatness of England. In his way home he took five or six frigates belonging to the Dutch fleet under Tromp, which had sailed to intercept him, but had been dispersed in a storm. After his return, he did great mischief to the enemy in the channel. And, in consequence of some hostilities which the French had committed at Newfoundland, he attacked a strong squadron, which they were sending to the relief of Dunkirk; and, having taken or destroyed them all, that place fell easily into the hands of the Spaniards. On the 28th of September he engaged the Dutch admirals De Witte and De Ruyter. A well-contested battle ensued. It ended in the defeat and flight of the Dutch. For this Blake received the thanks of the parliament. In his next encounter with them, however, which happened on the 29th of November, he was not so successful. Thinking that the season of action was over, he had detached above 40 of his ships to different stations; and the Dutch admiral hearing of this, seized the opportunity of attacking him near Dover Road with his whole force. Blake fought with his usual valour and obstinacy; but superiority of numbers at length prevailed, and, after suffering considerable loss, he was under the necessity of profiting by the darkness of the night, and retiring into the Thames. The parliament, hearing the real cause of the disaster, caressed the admiral as formerly; again appointed him to the command; and, in six weeks, provided him with a fleet of 60 ships of war. On the 18th of February 1653, he fell in with Tromp, who had a fleet of about the same numerical strength, and between 200 and 300 merchantmen under convoy. Tromp was surprised to find the English admiral so soon in a condition to meet him, and would probably have been glad to avoid fighting; but Blake was so stationed across the channel, that it was impossible to escape a battle. The battle lasted for two days, and was even renewed in the morning of the third, when Tromp, finding that nothing was to be expected from farther resistance, but the destruction of his fleet, thought proper to sheer off to Calais, from whence he cautiously coasted it home, our fleet pursuing slowly, and picking up the straggling ships. Blake was wounded in the first day of the action. On the whole, the Dutch lost, on this occasion, 11 ships of war, 30 merchantmen, and about 3000 killed and wounded. The English suffered about as much in men, but lost only one ship.

On the 20th of April, Oliver Cromwell dissolved the parliament by force, and assumed the supreme power. Blake's feelings and prepossessions were in favour of a commonwealth. He had lent his aid in giving vigour and respectability to that which had been lately established in England, and would, no doubt, feel a lively indignation at the violent and unexpected change which had taken place. But Blake loved his country better than any thing else. At this moment he saw her exposed to the attacks of powerful enemies. He was sensible, that any attempts to rekindle a civil war, or to set the naval and military forces at variance, would have endangered her independence. And, therefore, to preserve her strength unbroken, and her councils undivided, so far as his personal influence extended, he continued his efforts against the common foe, saying, to those under his command, "It is not for us to mind state affairs; but to keep foreigners from fooling us." Such conduct made him a favourite with all parties, because it shewed that he was a true and steady patriot. The town of Bridgewater returned him as their representative to the new parliament; and even Cromwell himself, to whom his republican sentiments, and unbending spirit, were perfectly well known, regarded him with affection, and treated him with confidence. He acted thus, because he was convinced, that Blake was influenced by views which looked farther than the advancement of any political faction, and would make greater exertions, from a pure regard to the welfare and glory of England, than others would do from all the motives of interest and ambition.

On the 2d of June, the English fleet, under Monk and Dean, attacked that of the Dutch under Van Tromp. Each consisted of about 100 ships of war. The action commenced at eleven in the forenoon, and continued with great warmth through the remaining part of the day. It had not lasted, however, many hours, when the enemy began to give way and fall into confusion. The arrival of Blake during the night, with 18 sail, decided their fate. For, next day, after Tromp had attempted, in vain, to avoid a renewal of the contest, a second engagement took place, in which, after a long and furious struggle, the Dutch were completely defeated, with immense loss both in ships and men. This, together with some other serious disasters which befel their trade and their navy, hastened on the negociation between Cromwell and the States, and led to the peace which was concluded on the 4th of April 1654.

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After the conclusion of the Dutch war, Cromwell ordered his navy to be repaired; and sent Blake with a considerable fleet into the Mediterranean to support the honour of the English flag, and to take vengeance on those powers by whom it had been insulted. This important commission he executed with his wonted spirit and success. The terror of his name commanded respect almost every where; and, when submission did not follow, he exacted it by force of arms. Several facts are recorded, which shew how much he was feared. While he continued in the Road of Cadiz, where he arrived in the beginning of December, the Spaniards behaved to him with the greatest reverence and civility. A Dutch admiral, who happened to be there, would not venture to hoist his flag till Blake's departure. One of his tenders happening to be separated in a storm, was stopped by a French squadron; but the admiral, as soon as he learned to whom the tender belonged, brought the captain on board his own ship, drank Blake's health before him under a discharge of five guns, and then dismissed him. The Algerines, too, were so much afraid of him, that they stopped the Sallee rovers, and obliged them to deliver up the English prisoners in their possession, whom they immediately sent to Blake to conciliate his favour.

From Cadiz, Blake sailed to Malaga; and, while in that port, an incident occurred, which served to place his peculiar temper and character in a striking point of view. Some of the sailors, who happened to be ashore, met the host as it was carried along the street, and not only refused to pay it any respect, but, with their characteristic thoughtlessness and humour, fell a laughing at the superstition. Upon this, the people, instigated by their priest, attacked the sailors, and beat them severely. They complained to the admiral, who instantly became very indignant, and sent a message to the viceroy, to demand the offending priest. The viceroy answered, that he had no authority over the priests. Blake then sent a second message, declaring, that it did not lie with him to determine who should send the priest; but that, if he was not sent, he would most certainly burn the town about their ears. The inhabitants hearing this threat, compelled their viceroy to send the priest, which, when he came before the admiral, excused himself, on account of the behaviour of the seamen. Blake told him, that if he had complained of the injury, they should have been punished; for he did not allow his men to insult the established religion of any place; but that he did wrong in stirring up a mob of Spaniards to beat *them*, and "that he would have him, and the whole world know, that none but an Englishman should chastise an Englishman."

We have mentioned, that the Algerines shewed ome marks of submission to the admiral. They d sinned, however, too deeply against England to forgiven on account of such partial oblations. ake, therefore, appeared before Algiers on the th of March, and sent an officer ashore to demand tisfaction for the piracies which he had committed gainst English ships, and the release of all the nglishmen whom they held in captivity. The Dey complied, as far as was possible, with the terms prescribed; promised the redemption of the prisoners, who were now private property, on the most easy terms; and offered to make a treaty with him, engaging to commit no hostilities against the English in future.

He next sailed to Tunis; there, however, the Dey not only refused his demands, but would not permit him to take in fresh water. "Here," said he, "are our castles of Golletto and Porto Ferino; do your worst." Blake, on hearing this, was highly incensed; and, according to his custom on such occasions, began to curl his whiskers. Having shortly consulted with his officers, he entered the Bay of Porto Ferino with his large ships, bore up within musket shot of the castle, from which 60 guns played on him at once, and opened such a tremendous fire, that, in two hours, he dismounted their artillery, and rendered the works quite defenceless. He also gave orders to attack and destroy all their shipping in the road, which service was gallantly performed, with the loss of above 70 men killed and wounded. From Tunis he went to Tripoli, where the government readily consented to liberate the English captives, and to conclude a peace. And returning thence to Tunis, he obliged the Tunisians to implore his mercy, and to beg of him a peace, which he granted, on terms equally mortifying to them, and advantageous for England. He also paid a visit to Malta, and compelled the knights to restore the effects which their privateers had taken from the English. By these daring enterprises, and successful exploits, he made his own name formidable, and so elevated the character of his country, that most of the Italian states sent solemn embassies to England to compliment his master, the protector.

Blake was in the Road of Cadiz, living on the best terms with the Spaniards, when intelligence came of the capture of Jamaica, and consequently of a Spanish war. In compliance with instructions from the protector, he watched the arrival of a Plate fleet that was expected, and succeeded in intercepting it. After cruizing for a considerable time on that station, he heard that another Plate fleet had put into the Bay of Santa Cruz, in the island of Teneriffe. He immediately set sail with 25 ships, and came to his point of destination on the 20th of April 1657. The Spanish ships, amounting to 16, of which 6 galleons were laden, were placed in a most secure and formidable position. They were not only capable of making an obstinate defence by their own strength, but also protected by a castle, which stood at the mouth of the haven, and was well supplied with heavy ordnance, and by seven forts situated round the bay, and joined by a line of communication, which was manned with musketeers. The Spanish governor thought himself quite safe; and was so confident of the excellence and sufficiency of his dispositions, that when the master of a Dutch ship, knowing the certainty, and dreading the consequences of an attack, asked leave to depart, he answered, angrily, "Get you gone, if you will, and let Blake come, if he dares." Blake called a council of war, in which it was determined to attempt the destruction of the enemy's ships, as it was impossible to bring them off. The attempt was made, and attended with perfect success. An attack was directed at the same time against the forts and the fleet; and the enterprise was so skilfully and gallantly conducted, that, in a few hours, the forts were abandoned by the Spaniards, and their fleet boarded and carried by the English, who burnt every ship to ashes, except two that were sunk. Had the wind which carried him into the bay continued to blow much longer in the same direction, Blake could scarcely have escaped; but fortunately it changed, and brought him safely out, leaving the Spaniards in astonishment, that he should, in such perilous circumstances, have dared to attack them, and that he should have succeeded so completely in accomplishing his object. Lord Clarendon tells us, that every body who knew the place, wondered that any sober man, whatever might be his courage, could think of such an undertaking; that the English could hardly persuade themselves to believe what they had done; and that the Spaniards took comfort, from the idea that they were devils and not men who had destroyed them in such a manner. At the same time, this event so subdued the spirits of the Spaniards, that afterwards, when opposed to the English, they had no dependence either upon numbers, or valour, or fortifications. We must not omit to mention a circumstance that occurred on this occasion, which was indicative of the disinterested zeal of Blake for the naval service, as the enterprise out of which it sprung was honourable to his ability and courage. His brother, Captain Benjamin Blake, for whom he entertained the warmest affection, had been guilty of some misconduct in the action. This being observed by the admiral, he sacrificed his private feelings to his sense of public duty, by removing his brother from the ship, and giving the command of it to another officer.

After this, Blake cruized for a short time off Cadiz; but finding his ships getting foul, and his own health gradually wearing away by a complication of dropsy and scurvy, he set sail for England. This distemper grew upon him during his passage home, and cut him off before he reached his native soil, on which he had shown a strong desire to draw his last breath. He died as his ship entered Plymouth Sound, on the 17th of August 1657, being about 59 years of age. His body, after lying in state for several days in Greenwich Hospital, was conveyed to Westminster Abbey, and interred in a vault, built on purpose, in the chapel of Henry VII. The funeral was magnificent. It was attended not only by his friends and relations, but by the Protector's privy council, the commissioners of the admiralty and navy, the lord mayor and aldermen of London, the field officers of the army, and a vast number more of quality and distinction. But the loss was public. The country at large felt, that they had been deprived of a hero and a friend; and expressed, in the language of universal regret and sorrow, the high sense which they entertained of his services as an admiral, of his worth as a patriot, and of his virtues as a man. Blake, in truth, was a rare character. No Englishman can read the history of his life without admiration and delight. We know of one only, in the naval records of Britain, whom we can willingly place before him,—we mean the late Lord Nelson; between whom and Blake, indeed, there are many points of resemblance, which the reader may easily trace. It may even be safely asserted, that the past and present maritime superiority of this empire, took its origin from the skill and bravery of Blake, who shewed his country what they were capable of accomplishing at sea, and taught all Europe, and more than Europe, to tremble at the British flag; and infused a spirit of greatness into the navy, which it never possessed before, and which has animated and upheld it ever since. See Campbell's *Lives of the British Admirals*. Clarendon's *History of the Rebellion*. Whitaker's *Memorials*, &c. (τ)

BLAKEA, a genus of plants of the class Dodecandria, and order Monogynia. See BOTANY. (w)

BLANC, MONT, a lofty mountain in France, and the highest of the Pennine Alps, is situated in the duchy of Faucigny, formerly a part of the king of Sardinia's dominions, but now subject to the Emperor of France. It receives its name from the immense mantle of snow, with which its summit and sides are covered, and which is estimated to extend not less than 12,000 perpendicular feet, without the least appearance of rock to interrupt its glaring whiteness.

When viewed from the Col de Balme and the vale of Chamouni, its summit seems to be of a roundish form, its surface smooth and covered with snow, its whole appearance uniting beauty with grandeur, and its towering head rising majestically above the surrounding mountains; but, when seen from the valley of Aost, its sides are less completely covered with snow, its aspect more rugged and dark, and the prospect which it presents partakes more of the wild and terrific. It rises imperceptibly from amidst the numerous irregular mountains, which bound the vale of Chamouni, then terminates rather abruptly in a point or top called *Aiguille de Goute*, or *Dôme de Goute*. Beyond this height, with a considerable hollow between, it forms another mount, called by some *Little Mont Blanc*, or more properly *The Middle Dome*. From this station it gradually sinks again into a concave surface, in the midst of which is a small pyramid of ice; and then reaches its highest point of elevation, which is in the shape of a compressed hemisphere, and is called from its form *La Bosse du Dromedaire*. Upon a nearer inspection, the summit of this gigantic mountain is found to be a very narrow ridge, lying nearly in a horizontal direction, resembling the roof of a house; and at its west end particularly, scarcely sufficiently broad to admit of two persons walking abreast. The snow, which covers the top, is encrusted with ice, of a firm consistence, but penetrable by a staff; and beneath this icy surface, especially on the declivities of the summit, is discovered a soft dusty snow without any cohesion.

The highest rocks of Mont Blanc are formed of strata of granite, running parallel to one another, and nearly in a vertical direction. Those on the east side are mixed with steatites; those on the south with

Blanc.

schœrl and lapis corneus; and some of them, about 150 yards below the summit, have the appearance of having been shivered with lightning.

Mont Blanc is unquestionably the highest mountain in Europe; and there is no reason to think, that it is surpassed by any in Africa or Asia. According to the calculations of De Luc, its height above the level of the sea is $2391\frac{1}{5}$ French toises, or 15,304 English feet; according to Sir George Shuckburgh, 15,662 feet; and according to other observations, 15,680 feet, or nearly three English miles above the level of the sea.

At the elevation of 11,392 feet above the sea, M. De Saussure observed the *silene acaulis*, or moss campion in flower; still higher, on the most elevated rocks, he found the *lichen sulphureus* and *lichen rupestris* of Hoffman; and, on the summit, he noticed two butterflies on the wing, which he supposed to have been driven thither by the wind. On the top of Mont Blanc, on the third day of August, Reaumur's thermometer stood, in the shade, at $2\frac{1}{10}$ below the freezing point, or 27 of Fahrenheit; while, at the same time, at Geneva, it was found at 22.6 or 82 of Fahrenheit, which gives a difference ot nearly 25 degreos of Reaumur, or 45 of Fahrenheit, between the temperature of the atmosphere at both places. De Luc's barometer fell to $16.0\frac{1440}{1600}$, while it stood at Geneva at $27.2\frac{1085}{1600}$, a difference of 11.2, with a small fraction. By experiments with the hygrometer, the air was found to contain six times less humidity than that of Geneva; and to this extreme dryness of the atmosphere, the burning thirst, which Saussure and his companions experienced in the extraordinary elevation, is supposed to have been owing. While 15 or 16 minutes are sufficient to boil water at Geneva, and 14 or 15 at the sea side, it requires half an hour on the top of this mountain. By experiments with the electrometer, the electricity of the air was found to be positive, and the balls diverged only three lines; and by experiments with lime water, and the caustic alkali, atmospheric acid, or fixed air, was detected in the atmosphere. Owing to the extreme rarefaction of the air, sounds were remarkably feeble, and the report of a pistol discharged on the summit, did not exceed that of a small Chinese cracker in a room. From the same cause, respiration becomes exceedingly difficult at so immense an altitude; and it was found, that the pulses of three persons, which beat at Chamouni, in a state of repose, 49, 60, and 72, were increased, on the summit of Mont Blanc, to 98, 112, and 100.

The ascent of this lofty mountain is particularly hazardous and toilsome; and in consequence of repeated failures on the part of those who made the attempt, was for a long time deemed utterly impracticable. A short sketch of these adventurous excursions may not be uninteresting to our readers; and may enable them (better than any description can do) to form a livelier conception of the amazing height and wintry horrors of Mont Blanc. The first attempt was made by M. Couteran, and three guides of Chamouni, Michael Paccard, Victor Tissay, and Marie Coutet. They set out from the priory about eleven o'clock in the evening, on the 13th of July 1776; and after spending 14 hours in surmounting many dangerous ascents, crossing vallies of ice, and traversing plains of snow, they reached the top next to Mont Blanc, about 13,000 feet above the Mediterranean. They at first imagined themselves to be within a league of its summit; but soon perceived, that it would require other four hours to reach it; and as the day was far advanced, and the vapours gathering into clouds, they were obliged, with regret, to relinquish their enterprize; and, after a journey of 22 hours, arrived at Chamouni about eight o'clock in the evening. The indefatigable Bourrit next excited a spirit of enterprise among the inhabitants of Chamouni; and after repeated unsuccessful attempts, he departed from Bionasay on the 11th of September 1784, accompanied by six guides, and was *scaling*, as he expressed it, the *rampart* of Mont Blanc, when he was so extremely affected by the intensity of the cold, as to be unable to proceed. But two of his guides, Marie Coutet, and Francis Guidet, having gone before their company, ascended to the dome of Gouté; passed the middle dome, and walked along the ridge between that and the summit, as far as some high rocks, which appear from the vale of Chamouni like small points in the snow; but the approach of night compelled them to return. On the 4th of September 1785, Marie Coutet, and James Balma, reached a place under a rock at a considerable elevation, where they passed the night; and setting out before sun-rise, passed the dome of Gouté, and were proceeding towards the summit, when a violent storm of hail obliged them to desist. On the 13th of September, Messieurs de Saussure and Bourrit, with twelve guides, left Bionasay, passed the night at a hut, which they had ordered to be constructed, about 7808 feet above the level of the sea, and reached the dome of Gouté next morning without much difficulty; but a fresh fall of snow rendered farther progress impracticable. In July 1786, six guides of Chamouni failed in another attempt; but James Balma, one of their number, having been separated from his companions, passed the night in a spot above the dome of Gouté, more than 12,000 feet above the level of the sea; and, having reconnoitred the situation next morning, observed a place of more easy access than any that had hitherto been attempted. On his return to Chamouni, he communicated his observation to Dr Paccard, a physician of the place, who attended him during a severe indisposition, the effect of the cold and fatigue to which he had been exposed; and in gratitude for that gentleman's attendance, engaged to conduct him to the summit of the mountain. They set out from Chamouni on the 7th of August, spent the night on the mountain of *La Côte;* at three in the morning pursued their route to the dome of Gouté; passed under the middle dome towards the east, along the ridge which is seen from Geneva, and which lies on the left of the summit. Here Dr Paccard was almost deterred by the cold and fatigue from pursuing the enterprise; but encouraged by Balma to proceed, and frequently walking sideways to shelter their faces from the piercing wind, they at length, about six o'clock in the afternoon, and after an ascent of 15 hours, attained the summit of Mont Blanc. They remained about half an hour on a spot, which no one before them had been able to reach, and where the cold was so intense as to freeze the provisions in their pockets, congeal the ink in their inkstands, and sink the mercury of Fahrenheit's thermometer to 18½ degrees; their faces were excoriated, their lips swelled, and their sight greatly debilitated by the reflexion of the snow. On the 13th of August 1787, M. de Saussure set out from Chamouni, accompanied by 18 guides, and provided with a tent, mattrasses, philosophical instruments, and all necessary accommodations. They passed the first night on the top of the mountain *La Côte*; encamped at four o'clock in the following afternoon, about 12,762 feet above the level of the sea; and next morning pursued the ascent in places frequently so steep, that the guides were obliged to hew out steps with a hatchet. After a very slow progress, and frequent halts for breath, they reached the summit about 11 o'clock in the forenoon; where they remained 1½ hours, enjoying a most sublime and extensive prospect, and making a variety of useful and interesting experiments. Here they observed the surrounding mountains, not in regular lines and continued ridges, as they appear when viewed from the plain; but in the most irregular groups and insulated masses; connected indeed at their bases, yet completely detached from each other, distinct in the forms, and separated at their summits. In this elevated station, they experienced great difficulty of respiration, which was increased by the slightest exertion, by a stooping posture, and by the use of wine or brandy; were kept in a state of continued fever, and tormented with a burning thirst; felt no appetite for food, no relish for strong liquors, no relief in any thing but in draughts of fresh water. About two o'clock in the afternoon they began to descend; and arrived next morning, without any accident, at the valley of Chamouni. On the 8th of August, a few days after Saussure's expedition, Mr Beaufoy, an English gentleman, succeeded in a similar attempt; but on account of the enlargement of the chasms in the ice, it was accomplished with greater difficulty. See Coxe's *Travels in Switzerland*, vol. 2. Saussure's *Voyages dans les Alpes*, vol. 4. Martyn's *Sketch of a Tour through Switzerland*, App. (*q*)

BLANC, Mont, the name of one of the new departments of France, formed out of Savoy. It is bounded on the east by the Alps, on the south by the department of the Upper Alps, and the department of the Doire, on the west by the departments of the Aix and the Isere, and on the north by the department of Leman. The principal rivers of this department are the Arc, which runs from south-east to north-west, and joins the Isere, near Mont Meillan; the Isere, which, rising in the Alps, runs from north-east to south-west; and the Guyers, which passes the bridge of Beauvoisin. The general aspect of this department is by no means beautiful; but it abounds in iron, copper, silver, lead, and coal. Probably, on account of the want of wood, the mine of St Georges-d'Heurtres is the only one which is actually worked. It employs nine large furnaces for the smelting of iron. The forests occupy 112,000 hectares, or from 218 to 219 arpens, and belong almost wholly to the communes. Superficial extent 1,254,796. Contributions in 1803, 1,148,533 francs. Population 283,106. The principal towns are, Chamberry, the capital; Anneci, St Jean de Maurienne, and Moutiers. (*w*)

BLANCHING. See Gardening.

BLANDFORD, an ancient town of England in Dorsetshire, situated on the river Stour, near the Downs. The streets are handsome, and the houses, which are of brick, are generally well built. The principal buildings are, a church, in the Grecian style, 120 feet long, and built in 1739; and a town-hall, built with Portland stone, on columns of the Doric order. This town has suffered severely by fire, before 1579, in 1677, in 1713, and in 1731. Near Blandford stood the famous Damary oak, which was rooted up in 1755. It measured 75 feet in 1797; the branches extended 72 feet; the trunk was 12 feet in diameter, and 17 feet above the earth; and the circumference of the bottom was 68 feet. In the cavity, which was 15 feet wide, an old man lived during the civil wars, and till after the Restoration. The only manufactures here are one of shirt and waistcoat buttons, and one of thread. Number of houses 405. Population 2326; of whom 480 were returned as employed in trade and manufactures. See Hutchinson's *History of Dorsetshire*. (*j*)

BLARNEY, a market town in the province of Munster, celebrated for several manufactories established in it by Mr Jeffries, to whom it belonged. Several of them have now fallen into decay, and the only ones which now exist, are a paper mill, a stamping mill, a bleaching establishment, and one or two cotton manufactories. See Mr A. Young's *Tour through Ireland*. (*j*)

BLASIA, a genus of plants of the class Cryptogamia, and order Algæ. See Botany. (*w*)

BLAST Furnaces. See Iron.

BLASTING of Rocks, is an operation of great importance in the formation of roads, or in the breaking up of uncultivated ground.

The process of blasting rocks, or stones, consists in boring a cylindrical hole, about 10 or 12 inches deep, in the rock, by means of a chisel for that purpose. The lower part of this hole is filled with gunpowder. The upper part of the hole is then filled up with fragments of stone, firmly rammed together; a hole being left through these materials, by the insertion of an iron rod, which is turned round during the operation of ramming. This hole is next filled with powder, and a match is applied to it in such a manner, that the operator has time to run out of the reach of the fragments of the rock.

This process, which is both tedious and dangerous, is now abandoned for one which is more simple and effectual, and which consists merely in introducing a straw, filled with gunpowder, among the powder at the bottom of the cylindrical hole in the rock, and filling the rest of the cylindrical hole with loose sand. By applying a match to the gunpowder in the straw, an explosion takes place; and, instead of the loose sand being driven out of the cylindrical hole, as might naturally be expected, the rock is completely shivered in pieces. Mr Jessop tried the experiment with great success on some of the hard rocks at Fortwilliam, and also on the lime works at Bristol.

Blatta.

Mr Farey mentions his having witnessed, near Aylesbury, a method of blasting large rocks without gunpowder. The rock was undermined for about a yard in length, and half a yard in depth, and a small faggot of brushwood, furze, or a bundle of straw, was introduced into the cavity. As soon as it was set on fire, the expansive force of the air, confined in the stone, burst it into innumerable fragments.

Mr Headrick proposes to blast rocks by introducing the purest quicklime into the cylindrical hole, instead of gunpowder. By suddenly slaking the lime, he conceives, that the expansive force would rend the stone in pieces. See Nicholson's *Journal*, vol. x. p. 230.; vol. xi. p. 241. *Communications to the Board of Agriculture*, vol. ii. *Philosophical Magazine*, vol. xx. p. 208. (*o*)

BLASTING Screw, the name of a simple apparatus for blasting logs of wood by the explosion of gunpowder, invented by Mr Richard Knight. The instrument is a screw, having a small hole drilled through its centre. When a log of wood is to be split, a cylindrical hole is bored, to a proper depth, with an auger, and a quantity of gunpowder introduced. The screw is then screwed into the cylindrical hole, till it nearly touches the powder, and a match is put down through the hole in the screw till it touches the charge. This match, which is about 18 inches long, and made of twine or linen thread, steeped in a solution of saltpetre, is then set on fire, and the log is broken in pieces. See *Transactions of the Society of Arts, for* 1802; and Nicholson's *Journal*, vol. v. p. 31. (π)

BLATTA, a genus of hymenopterous insects. See Entomology.

BLEACHING.

Bleaching.

Bleaching, is the art by which those manufactures which have vegetable substances for their raw material, are freed from the colouring matter with which such substances are naturally combined, or accidentally stained; and the pure vegetable fibre, deprived of these coloured matters, is left to reflect the different rays of light in due proportion, so as to appear white.

Besides the spoils of animals, mankind, to supply their natural want of covering, have, in all countries, had recourse to vegetable substances, preferring those whose fibres excelled in strength, durability, and pliancy; and experience having proved, that flax and cotton were well adapted to such purposes, these substances have been very generally adopted, and formed into such cloths as the skill and industry of the wearers could execute.

It would soon be observed, that the action of water, together with that of the sun and air, rendered those rude cloths whiter than they were at their first formation; and, since the first step towards refinement is to add beauty to utility, as the state of society improved, a desire to give them a pure and spotless white would naturally arise. The idea of white raiment being the emblem of innocence and peace, which seems to have been very early entertained, would make every means for facilitating the removal of natural or adventitious stains more earnestly studied.

Accident would probably discover, that a certain degree of putrid fermentation carried off colouring matters from vegetable fibres. Hence the practice of macerating cloth in water, mixed with putrid urine, and the dung of domestic animals, which has been continued to our days.

From the earliest accounts we have of India, Egypt, and Syria, it appears, that these enlightened nations knew the efficacy of natron, (the nitre of scripture,) an impure mineral alkali found in these countries, for combining with and carrying off the colouring matters with which cloth is stained; and it is still found in great abundance by the present inhabitants, and used for the same purpose. We are also informed by Pliny, (lib. xviii. c. 51.) that the ancient Gauls were acquainted with the use of a lixivium, extracted from the ashes of burnt vegetables as a detergent, and knew how to combine this lixivium with animal oil to form soap.

But, though these nations appear to have early acquired some knowledge of the art of bleaching, the progress of improvement which they made in it, when compared with the advantages which some of them enjoyed, was very inconsiderable. The same practices seem to have been handed down from one generation to another, without any material improvement. In India, it would appear, that the art of bleaching, as well as that of staining cloths of various colours, are not in greater perfection at present, than they are described to have been in the days of Herodotus. Even in Europe, where the arts, after they have been once introduced, have generally made rapid progress, the art of bleaching made very slow advances till towards the end of the 18th century.

Discovery of the oxymuriatic acid.

At this period, the oxymuriatic acid, and its effects, were discovered by the justly celebrated Mr Scheele; and its application to the art of bleaching, by Mr Berthollet, has given it an impulse towards perfection unknown in the history of any other art.* It now became evident, that oxygen had an affinity

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* As the facts respecting the introduction of the new method of bleaching are not generally known, and have been greatly misrepresented by some late writers on that subject, we shall make no apology for laying them before our readers.

The first attempt to apply the oxymuriatic acid to the art of bleaching, appears to have been made by Berthollet about the year 1786, (*Ann. de Chim.* ii. 160.) Influenced by the most liberal views, he made no secret of his experiments; and exhibited some of them in presence of Mr Watt of Birmingham, who was instantly impressed with the importance of the discovery, (*Ib.*) Early in the year 1788, an attempt was made by some foreigners to obtain a parliamentary grant; and, with the colouring matters with which cotton and linen manufactures are stained; and that, by a proper use of the alkalies, along with the oxymuriatic acid, these colouring matters could be removed, and the goods rendered white, in a space of time almost instantaneous, when compared with the former method of bleaching.

Upon these discoveries the present improved state of bleaching is founded. And, when the vast extent of the cotton and linen manufactures of Great Britain and Ireland is considered, every improvement in it must be admitted to be of the highest national importance. To exhibit the present state of this art, by giving a succinct statement of the late improvements, is the subject of the following article, which, for the sake of method, shall be arranged under the following chapters, viz.: 1. A description of the machinery used in the modern bleachfields. 2. Of the detergent and other substances used. 3. An account of the manner in which these substances are applied.

CHAP. I.

Of the Machinery used in Modern Bleachfields.

Machinery used in Bleaching.

The machinery and utensils used in bleaching are various, according to the business done by the bleacher. Where linen or heavy cotton cloths are whitened, and the business is carried on to considerable extent, the machinery is both complicated and expensive. It consists chiefly of a water-wheel sufficiently powerful for giving motion to the wash stocks, dash wheels, squeezers, &c. with any other operations where power is required.

Wash stocks. Plate LV. Fig. 6, 7.

Figures 6. and 7. Plate LV. represent a pair of wash stocks. AA are called the stocks or feet. They are suspended on iron pivots at B, and receive their motion from wipers on the revolving shaft C. The cloth is laid in at D, and, by the alternate strokes of the feet, and the curved form of the turnhead E, the cloth is washed and gradually turned. At the same time, an abundant stream of water rushes on the cloth through holes in the upper part of the turnhead. Wash stocks are much used in Scotland and in Ireland. In the latter country, they are often made with double feet, suspended above and below two turnheads, and wrought with cranks instead of wipers. Wash stocks, properly constructed, make from 24 to 30 strokes per minute.

This mode of washing is now entirely given up in Lancashire, where a preference is given to what are called dash wheels and squeezers. The dash wheels are small water wheels, the inside of which are divided into four compartments, and closed up, only leaving a hole in each compartment for putting in the cloth. There are, besides, smaller openings for the free admission and egress of the water employed in cleansing. The cloth, by the motion of the wheel, is raised up in one part of the revolution of the wheel; while by its own weight it falls in another. This kind of motion is very effectual in washing the cloth, while, at the same time, it does not injure its strength. This plan, however, where the economy of water is an object of any importance, is very objectionable, because the wheel must move at by far too great a velocity to act to advantage as a water wheel.

Pl LV. Fig.

Fig. 1. Plate LV. represents a dash wheel constructed to receive its motion from a shaft A, connected either with a water wheel or steam engine. The dash wheel, CD, is fixed on a separate axis, and is engaged or disengaged from the rest of the mill work by a very simple contrivance. On the end of the the shaft AB is a face wheel FG, with projecting teeth made to correspond with those of a similar face wheel HI. The axis of the dash wheel is made moveable endways; by sliding it forward, the teeth lay hold of one another, and the dash

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failing in that, a patent right, for a new method of bleaching, which they professed would shorten the process, and reduce it to a few hours. Mr Watt, however, having been made acquainted with Berthollet's discovery, and having actually applied it in practice to the whitening of 500 pieces of cloth, resisted this monopoly; and was joined by Mr Cooper and Mr Henry of Manchester, both of whom had also been successful in their attempts to apply the acid to the bleaching of cotton goods, though their experiments were conducted on a smaller scale. The opposition was effectual, and the foreigners were foiled in their attempt to obtain a patent.

Owing most probably to his distance from the seat of the cotton manufacture, Mr Watt did not himself embark in the practice of bleaching. Mr Cooper, however, formed an establishment for the purpose of applying Mr Berthollet's discovery; and Mr Henry not only engaged in a similar undertaking, but gave, to some of the principal bleachers in this country, the first instructions which they received respecting the new process. The method of the latter gentleman at first consisted, sometimes in immersing the goods in a watery solution of the gas, or in an alkaline ley impregnated with it, and sometimes in exposing the goods, previously moistened with water, to the action of the gas itself. Soon afterwards, he made a further improvement in substituting lime for alkali, as a means of condensing the oxymuriatic acid gas. An air-tight chamber was prepared, on the floor of which rested a stratum of lime and water, mixed together to the consistence of cream. Through this the goods were passed by means of a wince; and the chamber being filled with gas, the goods were alternately exposed to the lime liquor, and to the acid vapour. Thus an oxymuriate of lime was formed upon the cloth, which, after a sufficient continuance of the operation, was taken out, and exposed to the usual processes of washing, &c.

A very essential improvement in the application of lime was, some years afterwards, discovered by Mr Tennant of Darnley, near Glasgow, and was secured to him by a patent, dated January 30, 1798. It consisted in effecting a combination of oxymuriatic acid with lime, in a separate vessel, containing lime suspended in water by mechanical agitation. The redundant lime was allowed to subside, and the clear liquid, a solution of oxymuriate of lime, applied, properly diluted, to the purpose of bleaching. *It is remarkable, that this combination, even when the oxymuriatic acid is perfectly neutralized, has the power of bleaching light or thin goods, though it is much less active in discharging some vegetable colours. Hence this method has certainly a great advantage over all former ones, in the facility and safety of its application, especially to coloured goods, which would be discharged by the contact of either the acid or of lime in an uncombined form.* This patent has since been set aside by the decision of a court of law, with what justice we do not pretend to decide. Mr Tennant, however, still retains an exclusive right to a method, secured to him by a subsequent patent, of uniting the oxymuriatic acid with dry quicklime, and thus rendering the bleaching salt portable to any distance in the form of a powder. EDITOR.

wheel is thus carried round by the mill; by the sliding it backward, the teeth are disengaged, and the dash wheel ceases to move. LM represents the lever for this purpose. NNNN (Fig. 3.) are the holes for introducing the cloth into the four compartments; the partitions are equidistant from the holes. O (Fig. 2.) is the pipe which supplies the water for cleansing the goods. PQ is an open circle in the back of the wheel for introducing the water from the pipe O. The circle has a number of wires set all around to prevent any part of the cloth from escaping through the circle PQ. Near the circumference of the wheel are other holes, through which the water finds its way after passing from the cloth. Dash wheels are made to engage and disengage by various other modes than that which is described above. Circumstances make it necessary to vary these; and a judicious mill-wright will be at no loss how to adapt the mode of throwing the wheel in and out of gear to the rest of the mill-work.

A dash wheel, six feet and a half in diameter, and two feet and a half wide, making twenty-two revolutions per minute, is the most approved size and dimensions. The Plate represents the kind used in Lancashire, and in some parts of Scotland. In the neighbourhood of London, they are a little different in the mode of introducing the water. Instead of having the circumference close boarded, as in Lancashire, they are made of sparred work: The end of the water pipe is flattened so as to make the aperture very wide and narrow; and it is applied near the upper part of the circumference.

After the process of washing by the dash wheel, the water is compressed from the cloth by means of squeezers.

Squeezers consist of a pair of wooden rollers, which, in moving, draw the cloth through between them. The lower roller receives its motion from a mill, and the uppermost is pressed down upon it by means of levers. Till of late, these rollers were fixed in strong wooden frames; but the framing is now generally made of cast iron, which makes a neater and more durable piece of work.

Figures 4. and 5. represent one of these machines having a cast-iron framing, as constructed by Mr Parkinson of Manchester. A is the lower roller. B the upper roller. CD a lever which presses upon the brass of the upper roller. FE another lever to increase the power connected with CD. The extremity of F is kept down by a pin. In some cases a weight is used in place of the pin.

The improved mode of bucking was the invention of Mr John Lowrie, a native of Glasgow. It is now practised by many bleachers in Lancashire, some on more perfect plans than others; but we shall give the description of the kind of apparatus most approved of by those whose experience and skill have rendered them the most competent judges.

In Fig. 2. Plate LVI. ABCD is the wooden kieve containing the cloth. CEFD represents the cast-iron boiler. GG the pump. IK the pipe of communication between the kieve and the boiler. This pipe has a valve on each of its extremities; that on the upper extremity, when shut, prevents the ley from running into the boiler, and is regulated by the attendant by means of the rod and handle IB. The valve at K admits the ley; but, opening inwards, prevents the steam from escaping through the pipe IK. The boiler has a steam tight iron cover IL; and at CD, in the kieve, is a wooden grating, a small distance above the cover of the boiler.

At MNO is a cone and broad plate of metal, in order to spread the ley over the cloth. It is hardly necessary to say, that the boiler has a furnace, as usual for similar purposes.

While the ley is at a low temperature, the pump is worked by the mill or steam engine. When it is sufficiently heated, the elasticity of the steam forces it up through the valves of the pump, when it is disjoined from the mill.

NP is a copper spout, which is removed at the time of taking the cloth out of the kieve.

Boilers.

The boilers used in bleaching are of the common form, having a stopcock at bottom for running off the waste ley. They are commonly made of cast-iron, and are capable of containing from 300 to 600 gallons of water, according to the extent of the business done. In order that the capacity of the boilers may be enlarged, they are formed so as to admit of a crib of wood, strongly hooped, or, what is preferable, of cast iron, to be fixed to the upper extremity of it. In order to keep the goods from the bottom of the boiler, where the heat acts most forcibly, a strong iron ring, covered with netting made of stout rope, is allowed to rest six or eight inches above the bottom of the boiler. Four double ropes are attached to the ring, for withdrawing the goods when sufficiently boiled, which have each an eye for admitting hooks from the running tackle of a crane. Where more boilers than one are employed, the crane is so placed, that, in the range of its sweep, it may withdraw the goods from any of them. For this purpose, the crane turns on spindles at top and bottom; and the goods are raised or lowered at pleasure, by double pulleys and sheives, by means of a cylinder moved by cast-iron wheels.

Fisher's apparatus for making the oxymuriatic acid.

Before the year 1794, the apparatus used for making the oxymuriatic acid, was so very inconvenient and defective, that the health of the workmen employed was often injured, or at least their situation was rendered very uncomfortable, from the deleterious qualities of the gas. To remedy this defect, Mr Peter Fisher, late of Rutherglen, near Glasgow, in the year 1794, invented an apparatus * admirably calculated for this purpose, which, with very slight alterations, has been almost universally adopted. It consists of a leaden retort A, Fig. 4. Plate LVI. set on a tripod of iron D, into a cast-iron boiler B, built into brick-work, with a furnace and ash pit of the common construction EF. The top of the retort is closed with a leaden cover with screws and nuts, having an iron flenge of the same diameter above and below the mouth of the retort, with corresponding nuts and screws. The

Plate LVI. Fig. 4.

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* The apparatus here described does not differ essentially from that employed by Berthollet, and Pajet Des Charmes.

use of the flenges is to prevent the retort from being compressed out of shape, and thereby preventing its fitting properly. Between the joinings of the mouth of the retort, loose flax, dipt in white lead, ground in oil, is spread equally; and the whole is firmly screwed together. In the top of the cover, a circular hole is made of three inches in diameter, for introducing the materials for making the bleaching liquor, and cleaning out the retort. The hole is fitted with a plug of lead C, which is gently struck into the cover when the apparatus is arranged for working, and is luted with a little soft clay to prevent the escape of gas.

Plate LVI. Fig. 4.

The oxy-muriatic gas is conveyed by the lead tube G, which is two inches in diameter, into the intermediate vessel H, set upon a stand as in the figure. This vessel is circular, and is from 12 to 18 inches in diameter, according to the capacity of the other parts of the apparatus; the use of it is to prevent any impurity from descending by the leaden tube I into the receiver K, should the contents of the retort be forced upwards by the effervescence of the materials in it; but this is now seldom the case, since the distillation of the oxymuriatic acid is carried on by the use of the water bath, in place of heated sand.

The receiver K is a vessel of an inverted conical shape made of lead, where the capacity does not exceed 120 gallons, or of wood lined with lead when the quantity of work done is large. It is closely covered at top, and has a hole for introducing water into the receiver at M with a leaden plug. The brass stopcock for drawing off the oxymuriatic acid, is about two inches from the bottom of the receiver, as at N. In some apparatus' of this kind, two or three false bottoms, as they are called LL, made of lead, are laid on brackets of the same metal fixed to the side of the receiver. These false bottoms are pierced full of holes, in order to spread the oxy-muriatic gas through the water during the distillation.

CHAP. II.

Of the Detergent and other Substances used in Bleaching.

Of the detergent and other substances used in bleaching.

As it is of importance for the bleacher to be acquainted with the qualities of the substances he uses, and to know the proper methods of ascertaining their purity, in this Chapter we shall briefly point out the manner of arriving at the knowledge of this. The substances used in bleaching are chiefly,

1. Pot and pearl ashes.
2. Soda.
3. Soap.
4. Oxy-muriate of potash.
5. Oxy-muriate of lime.
6. Manganese.
7. Muriatic acid.
8. Sulphuric acid.

Potash.

1. Pot and pearl ashes, as they are imported from the United States of America, whence the principal supplies are derived, are of three different qualities: viz. first, second, and third sorts, the casks which contain them being branded by a hot iron with these distinguishing marks. As may naturally be supposed, the first sort is the best, the second next in quality, and the third sort the worst.

But the best potash, as imported, is by no means an alkali free from impurity, it being only comparatively so when its value is estimated with respect to the inferior kinds. It never contains above 70 per cent. of real alkali, but more frequently from 60 to 65 per cent.; the remainder of the mass consisting of sulphate and muriate of potash, muriate of soda, a portion of uncombined charcoal, carbonic acid, and five or six per cent. of water. As these substances possess no detergent qualities whatever, it is the interest of the bleacher to purchase only those kinds of potash which contain the smallest portion of these adventitious salts. The second sort of potash is often very impure, and the third or lowest quality is frequently designedly mixed with common salt, in order to increase the weight. The same observations are applicable to pearl ashes, which differ from potash only in containing a greater proportion of carbonic acid, and consequently are what is termed a milder alkali.

When a solution of pot or pearl ashes is made by bleachers, it is customary to ascertain the strength of the solution by the hydrometer, an instrument admirably calculated for this purpose, were these salts always of the same degree of purity. But as this is not the case, we shall point out two methods whereby this may be ascertained with a sufficient degree of accuracy.

1. It is a fact well known to chemists, that the strength of an alkali is in proportion to the quantity of any acid required to saturate it. Thus, if an ounce of one kind of potash requires for saturation a given quantity of sulphuric acid, and an ounce of another kind of potash requires twice that quantity, the latter is twice as strong as the former.

In order, however, to obtain a sufficiently accurate standard of comparison, it will be necessary always to employ an acid of the same strength. This may be effected sufficiently well for ordinary purposes, by diluting the common sulphuric acid of commerce to the same degree by the hydrometer. For example, let the standard consist of one part of acid and five of water. After the mixture has cooled down to the temperature of 60 degrees of Fahrenheit's thermometer, observe the height to which the hydrometer rises, and make this the standard for subsequent trials. The strength of an alkali will now be learned, by observing what quantity of this acid a given quantity of the alkali under trial requires for saturation. For this purpose, put half an ounce of the alkali into a jar with a few ounces of water, and filter the solution; weigh the diluted acid employed before adding it to the alkali; then pour it gradually into the solution till the effervescence ceases, and till the colour of litmus paper, which has been reddened with vinegar, ceases to be restored to blue. When this happens, the point of saturation will be attained. Weigh the bottle, to know how much of the acid has been added, and the loss of the weight of the acid will ascertain the strength of the alkali.

2. Another method recommended by Dr Higgins of Dublin, for ascertaining the purity of potash, is,

to take a given quantity of the alkali, and dissolve it in twice its weight of boiling water, stirring the mixture during the solution of the salt; while yet warm, it must be filtered through unsized paper. When all the liquor has passed through the filter, a very small quantity of cold water is gradually poured on the saline residuum on the filter, in order to wash out the remainder of the alkali. The undissolved salt remaining on the filter, is sulphate of potash, which must be carefully taken off, dried and weighed, in order to ascertain its quantity. To determine whether any common salt is contained in the alkali which has been filtered, evaporate the clear solution a little in a sand bath, and set it in a cool place for 24 hours; at the end of which time, any common salt it may contain, will be found crystallized in the form of regular cubes at the bottom of the vessel. The sulphate of potash and common salt being dried, weighed, and deducted from the weight of the crude alkali employed, will give the precise weight of the pure alkali it contains.

II. Pure carbonate of soda, or the mineral alkali, so much resembles the vegetable alkali, when used as an agent in bleaching, that little difference is observable in its effects when the strength of the alkaline leys and every other circumstance are the same. The high price at which soda has hitherto sold, has prevented its being generally used at the bleachfield; but since more economical processes are adopted in the manufacture of it, and since it is made in a greater degree of purity, its introduction into the bleachfield will naturally follow. It is admirably calculated, as a detergent, for the finishing of the finer fabric of muslin; it being ascertained beyond doubt, that 6 ounces of pure carbonate of soda, together with 10 ounces of soap, produce effects in bleaching equal to 1¼ pounds of soap, when used by itself.

2d, Barilla, as imported from Alicant in Spain, is in large masses, of a dark gray colour. It usually contains from 20 to 24 *per cent.* of pure mineral alkali, and never above 33 *per cent.* when in a state of the greatest purity. The remainder of the mass usually consists of sulphate and sulphite of soda, with a large proportion of charcoal and common salt.

The best method of extracting the soda from barilla, is to pound it, and fill a large wooden vat with it, the bottom of which has been previously covered with straw, to act as a filter; the vat is then filled with cold water, which is allowed to remain for some time to dissolve the salt. When sufficiently strong for use, the solution is run off at the bottom of the vessel by a stopcock, by which means it is freed from the charcoal and other impurities. Fresh water is again poured on the barilla, until the whole of the salt is dissolved. By this operation the soda is extracted, which being a very soluble salt, is easily dissolved by the water; but, at the same time, the common salt, which is equally soluble, together with a portion of the sulphate of soda, is also dissolved, which contaminate the solution, and have no effect as detergents. On this account, pure soda is certainly preferable for bleaching, (when it is not too high priced,) as it contains none of the foreign salts contained in barilla, which retard in place of promoting the process of bleaching. The bleachers in Ireland formerly used large quantities of barilla, but its use is now almost universally given up, potash being substituted in its stead.

Kelp.

3d, Kelp would be unworthy of notice, were it not that it is still recommended by some as a detergent in bleaching.

As at present manufactured, kelp is very inferior in this respect: The very best Scotch kelp never contains above 7 or 8 *per cent.* of mineral alkali, but more commonly from 3 to 5 *per cent.* Considering the other impure substances contained in kelp, it is at present unworthy of attention. But there is no doubt, that if proper methods were adopted for the manufacturing of it properly, it may be very much improved in quality. In the present rude manner in which it is made, the marine plants called Fucus Serratus and Fucus Vesiculosus of Linnæus, being cut at midsummer, and dried by the sun and air, are burnt in holes made in the sea beach: when a large portion of it is burnt together, part of the salt fused by the strong heat combines with sand, and other earthy matters, and forms an imperfect glass. In a furnace properly constructed, with a graduated heat, we have known kelp made of a quality far superior to the very best of that which is made by the common process.

It has been suggested, that were the sea plants, from which the kelp is made, previously washed in fresh water before they are dried, they would thereby be freed from a large portion of the marine acid adhering to them, which remains undecomposed during the burning of the plant when it is converted into kelp. This theory supposes, that the plant, during the progress of its growth, has the power of decomposing the sea-water, and retaining soda as one of its component parts: and that if this be the case, and if the combustion of the plant were properly conducted, a salt nearly equal in value to barilla would be the product. These facts may be easily proved by those who have skill to ascertain, and opportunity to investigate, a matter which is of considerable national importance.

Real alkali contained in different salts.

In order to ascertain the quantity of real alkali contained in the different detergent salts used in bleaching, M. Descroizilles sen. employed the method before mentioned, by saturating a given quantity of the alkaline salt with diluted sulphuric acid, the specific gravity of which was always the same.

After many thousand trials during the course of 25 years practice, the following are the mean results:

	Real Alkali in 100 Parts.	
Best American pearl ashes,	60	to 73
Caustic ditto pot ashes in reddish lumps,	60	63
Second ditto ditto in gray lumps,	50	55
Second ditto pearl ashes,	50	55
White Russian pearl ashes,	52	58
White Dantzic ditto,	45	52
Alicant barilla,	20	33
Inferior kinds of barilla,	10	15
Natron,	20	30
Salt of tartar of the shops,		72

To these may be added the following from Mr Kirwan's tables of the composition of salts:

	Alkali.	Acid.	Water.
Crystallised carbonate of potash,	41	43	16
Ditto carbonate of soda, ...	21½	14½	64
Ditto ditto desiccated, ...	60	40	

Hence it appears evident, of what importance it is to bleachers, and others who use alkalis in any quantity, to have it in their power to ascertain the quantity of pure salt contained in them; as, by a proper knowledge of this, great saving may be made by them in the course of their business.

Soap.

III. Soap is an article so well known, that it requires no particular description. It is sold of three different kinds, viz. brown, white, and soft soaps. It is the two latter kinds which are chiefly used in bleaching; the former being commonly sold for household washing in some parts of Britain.

Oxymuriatic acid.

IV. Of all the agents used in bleaching, there is none of them which ranks higher for giving facility and dispatch to the various operations than the oxymuriatic acid.

We might even at this moment have been unacquainted with the cause of the destruction of the colouring matter of vegetable substances, if the discovery of this acid, and its effects on colouring matter, had not pointed it out to us. For this discovery, and its inestimable advantages, the arts are indebted to the celebrated Scheele. While employed in making experiments on manganese, about the year 1774, he noticed its powers in rendering vegetable substances colourless, more as a matter of curiosity than of use. Having communicated his observations to Berthollet, in France, about the year 1786, the latter lost no time in applying the properties of this curious and interesting substance to the most important practical purposes. His application of it to the bleaching of cotton and linen cloth proving successful, he published the result of his experiments in the year 1789. The new method of bleaching was quickly and successfully introduced into the manufactories of Rouen, Valenciennes, and Courtray; and soon after into those of Manchester and Glasgow; and it has since been generally adopted in Great Britain, Ireland, France, and Germany. The advantages which result from this method of bleaching, in every season of the year, can be best appreciated by commercial people who experience its beneficial effects in many ways, but particularly in the quick circulation of their capitals.

Great difficulties at first impeded its progress, arising chiefly from prejudice, as well as from the ignorance of the bleachers in chemical processes. These obstacles were however soon removed by the assistance of several eminent chemists at Glasgow and Manchester, particularly Messrs Watt, Henry, and Cooper. See p. 577, *Note*.

Mr Berthollet's process for forming the oxymuriatic acid, consisted in distilling one part of the black oxide of manganese with two parts of muriatic acid in a glass retort: the product of the distillation was received in glass bottles, properly applied, when the quantity was small, or into a receiver lined with lead when the quantity was larger.

From the volatility of the oxygen as united with the muriatic acid, when simply diffused in water, with which it has a very slight affinity; and, consequently, its unequal action on the goods which were immersed in it for the purpose of being whitened, and its discharging those colours which were wove into the goods intended to remain permanent; as well as the suffocating vapours arising from it proving hurtful to the health of the workmen employed, it soon became evident, that the application of it in an extensive manner would be impracticable if these difficulties were not more or less removed. Various attempts were made to effect this; and since it has been accomplished, a number of persons have put in their claims as the inventors of so advantageous an improvement. Mr Higgins of Dublin and Mr Berthollet had both combined the oxymuriatic acid with potash, so early as the year 1788. The knowledge of the latter's having done so, and that the acid was thereby deprived of its offensive smell, induced the bleachers at Javelle, in France, to add a solution of caustic potash. Hence the oxymuriatic acid combined with an alkali, is usually known by the name of the Javelle liquor.

Notwithstanding this evident improvement, it was still generally maintained by chemists, that the oxymuriatic acid, united simply with water, possessed greater bleaching power than that which is combined with caustic alkali; but this was contradicted by the practical bleachers, whose experience taught them, that though the acid, thus combined with an alkali, whitened with somewhat less rapidity, it had the advantage of retaining the gas much longer in open vessels, and of preserving fixed dyed colours, such as the Turkey or Adrianople red. These facts are now so fully established, that although several attempts have been made, since the year 1796, again to introduce the oxymuriatic acid, diffused simply in water, into air tight vessels, to prevent its offensive smell, yet, from a conviction of its absurdity, it has been adopted only by a few.

In order to produce the oxymuriatic acid, bleachers follow different methods to obtain a liquor which they suppose possesses the highest bleaching powers. In one point they generally agree, which is, in giving a superabundance of the materials employed, by which they are certain of procuring a liquor which possesses high bleaching powers. One of the most common proportions of materials employed for making this acid, is to take equal parts, by weight, of common salt and manganese, which are intimately mixed together. Some bleachers moisten the mixture with water, to the consistence of a thick paste, so that the dissolved salt may incorporate more intimately with the manganese. An equal weight of sulphuric acid is taken as of the other meterials, which is diluted with its bulk of water, and allowed to cool before being poured into the retort on the combined salt and manganese. The charge for the distillation thus consists of equal parts of salt, manganese, and sulphuric acid, diluted with an equal bulk of water.

In the above proportions of the materials, it is evident, that the quantity of sulphuric acid employed is more than sufficient for expelling the muriatic acid from the salt; two-thirds of the former acid being enough to disengage the latter at a moderately high temperature. Hence, when equal parts of salt, manganese, and diluted sulphuric acid, are used in the distillation of the oxymuriatic acid, the residuum taken from the retort is uniformly found to be supersulphate of soda combined with manganese. The quantity of manganese used is also too great, and much of this substance is wasted, no more being necessary than is sufficient fully to oxygenise the muriatic acid during the distillation.

At the same time, it is proper to remark, that the proportion of manganese must be subject to variation according to its quality.

Mr Rupp of Manchester (*Trans. of the Lit. and Phil. Soc. of Manchester*, vol. v.) recommends, manganese 3 parts, common salt 8, sulphuric acid 6, water 12. The bleachers in the neighbourhood of Glasgow commonly use equal parts of salt, manganese, sulphuric acid, and water, as mentioned above. In Ireland, the common proportions are said to be, manganese 6 parts, common salt 6, sulphuric acid 5, water 5. In France and Germany, we understand, they vary little from the following: manganese 20 parts, common salt 64, sulphuric acid 44, water 54.

Besides the above methods of making the oxymuriatic acid, that which was originally introduced by Mr Berthollet has again been used by several bleachers, on account of the high price of potash. It consists of introducing one part of oxide of manganese into the retort, on which is poured two parts of muriatic acid, of the specific gravity of 1200, which is diluted with its bulk of water.

The reason given by those who have again resorted to the latter process for making this acid, is, that one-half of the quantity of alkali is sufficient for neutralizing it in the receiver, because the oxymuriatic acid gas is presented in a pure state without any mixture of sulphureous acid gas, which they suppose is always produced by a part of the sulphuric acid being decomposed in the retort by the impurities mixed with the oxide of manganese; and that, in consequence, one-half of the alkaline lixivium is sufficient, no more alkali being necessary than a sufficiency to retain the oxymuriatic acid gas in a proper state of neutralization for the purposes of bleaching. Whatever of theory may be in these inferences, it is certain, that bleaching liquor made in this manner possesses power equal, if not superior, to any in use, for rendering goods white expeditiously.

We shall now describe the preparation of the oxymuriatic acid combined with potash, as conducted in the apparatus invented by Mr Fisher. See Plate LVI. Fig. 4.

Supposing the receiver K to contain 120 gallons English wine measure, it is filled at the hole M with a solution of caustic potash of the specific gravity of 1015; the lead stopper is then replaced. Twenty-one lbs. of common salt being intimately mixed with fourteen lbs. of the black oxide of manganese, the mixture is moistened with water, and wrought together until it is of the consistence of moist dough. By this means, the salt, in a state of solution, unites more intimately with the manganese. The top of the retort being removed, the salt and manganese are put into it; the cover is then replaced, and firmly screwed on its place.

Into 16 lbs. of sulphuric acid pour gradually the same weight of water, and allow the mixture to cool. One half of the diluted acid is poured, by a lead funnel, into the retort by the hole at C, which is then closed by the lead plug to prevent the escape of the oxymuriatic acid gas which is instantly disengaged, after which a violent agitation is heard in the receiver K. The distillation is usually begun in the evening, and the workman, after seeing the operation going properly forward, leaves it to work of itself. In the morning, the distillation having abated, the remainder of the diluted sulphuric acid is poured into the retort, when a fresh disengagement of the gas takes place. As soon as it is observed to slacken, a fire is put into the furnace in order to heat the boiler B, which is filled with water, into which chaff or any similar light substance is put to prevent the evaporation of the water. By the increased heat of the water, the distillation goes forward with renewed vigour; and the fire is continued until no more gas is disengaged, which is known by the bubbling noise in the receiver being no longer heard. The oxymuriatic acid combined with potash may now be drawn off by the stop-cock N from the receiver for use.

In the above process, the sulphuric acid having a greater affinity for the soda contained in the common salt than that which the muriatic acid has, the latter is disengaged from the soda, and, acting on the manganese, it deprives it of its oxygen, which now existing in the state of oxymuriatic acid gas, by its expansive force is impelled forward through the tubes G and I into the receiver K, where it is absorbed by the caustic alkaline solution.

Oxymuriate of lime.

V. No farther improvements seem to have taken place in the combination of this acid with any other substance than the alkalis until the year 1798, when Mr Charles Tennant of Glasgow, by a well conducted series of experiments, shewed, that it was capable of being united with what are called the alkaline earths, such as barytes, strontites, and lime. Lime being most readily procured, after a number of trials he found, that, by mechanical agitation, and in consequence of the suspension of the finer particles of the lime in water, it readily united with the oxymuriatic acid gas, and was thereby completely dissolved. When, therefore, a sufficient quantity of finely pulverised quicklime is put into the receiver K in place of potash, and mechanically agitated during the distillation of the oxymuriatic acid, it will be found that it is entirely dissolved, and forms a pure and transparent solution of oxymuriate of lime, possessing the same power of retaining the gas as the alkalis do.

Mr Tennant has since carried this improvement to a greater degree of perfection, by combining the oxymuriatic acid with quicklime in the dry way, and thus rendering it portable to any distance at a small expence. For this further improvement he justly received another patent, which secures him the exclusive right of this valuable manufacture. This discovery is of great importance, as, by means of so common and cheap a substance as lime, great savings are made by the bleacher in the expence of alkali; and this improvement may not improperly be called a new era in the history of bleaching.

For use, the concrete oxymuriate of lime is diffused in water by agitation; the insoluble matter contained in the lime is allowed to subside until the liquor is transparent. When drawn off for use, it is further diluted with water before the goods are immersed in it, in order to be whitened.

Manganese. VI. The oxide of manganese, when of a good quality, is of a black shining colour; when combined with oxygen at a maximum, it contains 44 parts of the metal with 66 parts of oxygen; but as taken from the mines which contain it, it is never found so pure. The principal defect of manganese arises from its being united with chalk, or ores of iron; and when any of these are mixed in quantity with it, its effect is proportionably weakened in making bleaching liquor. The presence of carbonate of lime may be discovered in manganese, by pouring on a portion of this substance nitric acid diluted with eight or ten parts of water. If the manganese be good, no effervescence will ensue, nor will the acid dissolve any thing; but if carbonate of lime be present, it will be taken up by the acid. To the solution add a sufficient quantity of carbonate of potash to precipitate the lime. Its weight will show how much chalk the manganese under examination contained.

The adulteration of manganese when it is mixed with the ores of iron is less easily discovered. But if the iron be in such a state of oxidation as to be soluble in muriatic acid, the following process may discover it: Dissolve a portion of the manganese in strong muriatic acid, with the assistance of heat; dilute the solution largely with rain-water, and add a solution of crystallized carbonate of potash. The manganese will remain suspended by the excess of carbonic acid, but the iron will be precipitated in the state of a coloured oxide, on mixing the two solutions. From an observation of Klaproth's, (*Essays*, i. p. 572.) it appears that oxides of iron are separable by nitrous acid, with the addition of sugar, which takes up the manganese only.

Sulphuric acid. VII. Sulphuric acid, or oil of vitriol, as it is commonly called, when pure, is a transparent, colourless fluid, slightly viscid, and without smell. The specific gravity of the sulphuric acid of commerce is generally 1850, or almost twice the weight of distilled water. The manufacture of it is now carried on to such extent in Great Britain, that any further description of a substance so well known is unnecessary. The only substances with which it is ever adulterated are lead, and supersulphate of potash. A small portion of lead is taken up during its formation, in chambers of that metal, and its subsequent concentration in boilers. On this account, a white precipitate is often found in the bottom of the bottles containing it, which is sulphate of lead. After the combustion of the sulphur and nitre in the manufacture of sulphuric acid, supersulphate of potash is left as a residuum, by the affinity of the potash contained in the nitre with the sulphuric acid. Some manufacturers add a strong solution of this salt to the water which is put into the lead chambers where the sulphuric acid is formed. Now, in proportion to the quantity of potash contained in this solution, in so far is the specific gravity increased, and, in consequence, the sulphuric acid is rendered ineffectual for answering the purposes of bleaching.

This adulteration is carried so far as frequently to leave only four-fifths of pure acid. Hence it ought to be the bleacher's study to purchase what contains only pure sulphuric acid.

VIII. The muriatic acid of commerce has generally a slightly yellowish tinge, which proceeds partly from the impurities contained in the common salt from which it is made, and partly from its being distilled in iron retorts. When distilled in glass vessels from pure salt, the muriatic acid is perfectly colourless, and its specific gravity is about 1170.

CHAP. III.

An Account of the Manner in which these Substances are applied.

The common operations of bleaching consist of

Steeping,
Bucking,
Boiling,
Immersion in the oxymuriatic acid,
Souring, washing, &c.

Sect. I. *On Steeping.*

In the preparation of yarns for weaving, whether composed of flax or cotton, it is necessary that the weaver employ some gelatinous substance to give the threads the requisite adhesion to stand the operation of weaving. This substance is commonly made of wheaten flour, boiled in water to the consistence of pap, which is applied to the threads with a brush. This is the principal extraneous matter upon the goods, which it is the business of the bleacher to remove. To accomplish this, the linens, after being properly assorted, are washed in the wash stocks (Plate LV. Fig. 6.) for some hours, in order to free them from loose stuff which may be attached to them. They are then put into a large circular vat, made of fir-deal boards, called technically a kieve, into which they are laid regularly one above another, without being too much compressed. After the goods are disposed in the kieve, it is filled with alkaline ley, at a blood-heat, which has been already used in bucking or boiling former parcels. A piece of wood, in the form of a cross, is then fixed above the goods, in order to keep them below the liquid.

In a few hours an intestine motion is observable, and an increase of temperature takes place; the liquid swells; bubbles of air rise to the surface; and a thick scum is thrown up. This fermentation continues from twelve to eighteen hours, according to the state of the weather. So soon as it is observed that it has ceased, the goods must be instantly withdrawn from the kieve, and again carried to the wash stocks, or to the dash wheel, in order to be cleared from the loosened filth. Should the goods be left too long in the steep, they are liable to considerable damage; as, after the acetous fermentation ceases, the putrid fermentation begins, and the coloured matter, in place of being loosened from the goods, is fixed in them; and, at the same time, the dissolution of the vegetable fibre of the cloth is begun, and were they to remain too long in this state they would absolutely rot. It is therefore the bleacher's care to guard against so serious an accident.

SECT. II. *On Bucking.*

This is one of the most important operations in the bleaching of linen goods. There are several methods whereby this process is carried on, but of these we shall only select two, distinguishing them as the old and new methods of bucking. In the former way, the linens having been steeped in the alkaline ley, as before described, and afterwards well washed, are regularly arranged in a large wooden vat, or kieve; a boiler of sufficient capacity is then filled with caustic alkaline ley, which is heated to the temperature of blood. The boiler is then emptied by a stopcock upon the linens in the kieve, until they are covered with the liquor. After having remained on the cloth for some time, it is run off by a stopcock at the bottom of the kieve, into an iron boiler sunk in the ground, from whence it is raised into the boiler by a pump. The heat is now raised to a higher temperature, and the ley again run upon the goods in the kieve; from whence it is returned into the boiler, as before described: and these operations are continued, always increasing the heat, until the alkaline ley is completely saturated with the colouring matter taken from the cloth, which is known by its having acquired a completely offensive smell, and losing its causticity.

When we consider the effect which heated liquids have upon coloured vegetable matter, we shall see the propriety of the temperature of the alkaline ley being gradually increased. Thus, when vegetable substances are hastily plunged into boiling liquids, the colouring matter, in place of being extracted, is by this high temperature fixed into them. It is on this principle which a cook acts in the culinary art, when the green colour of vegetables is intended to be preserved: in place of putting them into water when cold, they are kept back until the water is boiling; because it is well known, that, in the former case, the green colour would be entirely extracted, whereas, when the vegetables are not infused until the water is boiling, the colour is completely preserved, or fixed. On the same principle, when the temperature of the alkaline ley is gradually raised, the extractive and colouring matter is more effectually taken from the cloth; and the case is reversed when the ley is applied at the boiling temperature, so much so, that linen which has been so unfortunate as to meet with this treatment, can never be brought to a good white.

When the alkaline ley is saturated with colouring matter, it is run off, as unfit for further use in this operation. But were the linens to be instantly taken out of the kieve, and carried to be washed in the dash-wheel while hot, a certain portion of the colouring matter would be again fixed into them, which is extremely difficult to eradicate. In order to prevent this, the most approved bleachers run warm water upon the cloth so soon as the impure ley is run off; this combines with, and carries off part of the remaining impurities; a stream of water is then allowed to run on the cloth in the kieve, until it comes off almost transparent. The linens are now taken to the wash-stocks, or to the dash-wheel, to be further cleaned, with the greatest safety.

The process of bucking was long carried on in this manner without any improvement, until Mr John Lourie, as before narrated, introduced an apparatus admirably calculated for conducting this operation on the large scale, which being in some measure self operative, much labour, as well as a considerable quantity of alkali, is saved.

PLATE LVI. Fig. 2.

The boiler (Plate LVI. Fig. 2.) being filled with caustic alkaline ley, and the linens being properly arranged in the wooden kieve above it, the handle of the pump GG is set in motion by the machinery: the ley now flows through the pipe N by the working of the pump, and falling on the broad plate of metal MO, it is spread in a perpetual current on the cloth, while the valve K opening inwards, admits the ley to return into the boiler. Immediately on the pump being set to work, a fire is put to the boiler, by which the ley being gradually heated, the linens receive the benefit of the regular increase of temperature, and the colouring matter from the cloth is thereby more effectually removed. When the ley begins to boil, the handle of the pump is detached from the machinery of the water wheel, and by the ley being completely confined in the close boiler, it is forced up the pump, and falls in a perpetual stream through the pipe N upon the linens in the kieve ABCD.

The efficacy of this manner of conducting the bucking process must be evident at first sight: while the heat is gradually increased, a current of fresh ley is constantly presented to different surfaces of the goods for saturation, thereby rendering it more active in cleansing them. Besides, the manner in which the apparatus is first wrought by the water wheel, or steam engine, and its self-operating power afterwards, puts it completely out of the power of servants to slight the work, independent of the great saving of alkali, which, in most cases where it has been applied, amounts to from one-fourth to one-third of the quantity formerly used.

SECT. III. *On Boiling.*

On boiling.

In the bleaching of linen cloth, boiling is only used when the goods are nearly white, with pearl ashes alone, or with pearl ashes along with soap towards the end of the whitening process: all that is necessary in this operation, is to keep the goods completely under the liquid, so that it may act uniformly upon them. In no case is the boiling carried on in a violent manner, but with a gentle simmering heat. The boilers are made of cast iron, of the common construction, with a large stopcock at bottom, in order to empty it of the waste ley.

SECT. IV. *Immersion in the Oxymuriate of Potash.*

Immersion in the oxymuriate of potash.

According to the doctrine of modern chemists, the oxymuriatic acid, in consequence of yielding up its oxygen to the colouring matter of vegetables, thereby deprives them of colour, and by this means they are further prepared for alkaline substances acting upon them, and fitting them for the reception of oxygen in subsequent immersions. We have already described the method of preparing the oxymuriatic acid with potash at some length, and have now only to remark, that the common way of diluting it for use, is by adding it in sufficient quantity to pure water, until the specific gravity of the mixture is 1005. The linens, after being clean washed, are steeped in it for twelve hours, then drained, and washed for being further bucked or boiled.

Sect. V. *On Souring.*

On souring.

Souring is in general the last or finishing process in bleaching, as afterwards the linens are only further washed in spring water, in order to their being blued and made up for the market.

In preparing the sour, into a large fir tub, lined with lead, as much sulphuric acid is added to water as will give it the acidity of strong vinegar. The acid and water must be well mixed together before immersing the linens, which are generally steeped in it for twelve hours, then drained, and washed in pure water. The operation of washing must be paid particular attention to after this process; were any of the acid to remain in the goods, and to be dried into them, they would infallibly rot, although the acid has no such effect upon them while they are kept wet.

What effect souring has in bleaching, neither the practical bleacher nor the chemist have attempted to determine. It is certain, that, from frequent use, it completely loses its acidity, and remains an inert substance, similar to a neutral salt. Some suppose that it is saturated with the remaining alkali which has not been completely washed from the goods; with iron, which is said to be a component part of all vegetable substances; or with earth, which is likewise said to be contained in them. Whatever may be in these conjectures, it is certain, that when linens are soured about the middle of the bleaching process, it has a considerable effect in hastening forward the goods to a complete white, and, in consequence, early souring has been adopted by the best practical bleachers.

Having made these preliminary observations with regard to the method of applying the various articles used in bleaching linen cloth, we shall now bring the whole into one point of view, by detailing the connection of these processes, as carried on at a bleachfield which has uniformly been successful in returning the cloth of a good white, and otherwise giving satisfaction to their employers; and we shall only previously remark, that we by no means hold it up as the best process which may be employed; as every experienced bleacher knows, that processes must be varied, not only according to existing circumstances, but also according to the nature of the linens operated upon.

In order to avoid repetition, where washing is mentioned, it must always be understood that the linen is taken to the wash stocks, or dash wheel, and washed well in them for some hours. This part of the work can never be overdone; and on its being properly executed between every part of the bucking, boiling, steeping in the oxymuriatic acid, and souring, not a little of the success of bleaching depends. By exposure is meant, that the linen cloth is taken and spread upon the bleachgreen for four, six, or eight days, according as the routine of business calls for the return of the cloth, in order to undergo further operations.

" A parcel of goods consists of 360 pieces of those linens which are called Britannias. Each piece is 35 yards long, and they weigh on an average 10 lbs. each: the weight of the parcel is, in consequence, about 3600 pounds avoirdupois weight. The linens are first washed, and then steeped in waste alkaline ley, as formerly described under these processes; they then undergo the following operations:

1st, Bucked with 60 ℔ pearl ashes, washed, exposed on the field.
2d, Ditto . . . 80 . . . do. . . . do. . . do. . . . . . do.
3d, Ditto . . . 90 . potashes, . . do. . . do. . . . . . do.
4th, Ditto . . . 80 . . . do. . . . do. . . do. . . . . . do.
5th, Ditto . . . 80 . . . do. . . . do. . . do. . . . . . do.
6th, Ditto . . . 50 . . . do. . . . do. . . do. . . . . . do.
7th, Ditto . . . 70 . . . do. . . . do. . . do. . . . . . do.
8th, Ditto . . . 70 . . . do. . . . do. . . do. . . . . . do.
9th, Soured one night in dilute sulphuric acid, washed.
10th, Bucked with 50 ℔ pearl ashes, washed, exposed on the field.
11th, Immersed in the oxymuriate of potash 12 hours.
12th, Boiled with 30 ℔ pearl ashes, washed, exposed on the field.
13th, Ditto . . . 30 . . . . . do. . . do. . . . do. . . . . . do.
14th, Soured, washed.

The linens are then taken to the rubbing board, and well rubbed with a strong lather of black soap, after which they are well washed through pure spring water. At this period they are carefully examined, and those which are fully bleached are laid aside to be blued and made up for the market; while those which are not fully white, are returned to be boiled and steeped in the oxymuriate of potash, and soured, until they are fully white."

By the above process, 690 pounds weight of alkali is taken to bleach 360 pieces of linen, each piece consisting of 35 yards in length; so that the expenditure of alkali would be somewhat less than 2 ℔ for each piece, were it not that some part of the linens are not fully whitened, as above noted. Two pounds of alkali may therefore be stated as the average quantity employed for bleaching each piece of goods.

The method of bleaching linens in Ireland is similar to the foregoing; any alteration in the process depending on the judgment of the bleacher in increasing or diminishing the quantity of alkali used. But it is common at most bleachfields to steep the linens in the oxymuriate of potash, or lime, at an early stage of the process, or after the goods have undergone the fifth or sixth operation of bucking. By this means, those parts of the flax which are most difficult to bleach are more easily acted upon by the alkali; and, as before noticed, souring early in weak diluted sulphuric acid assists greatly in forwarding the whitening of the linens. Mr Grimshaw, calico printer near Belfast, was the first who recommended early souring, which has since been very generally adopted.

CHAP. IV.

Bleaching for Calico Printing.

In bleaching linen and cotton cloth, for the purpose of being stained with different colours, in the process of calico printing, a pure white is not so much sought for, as that the goods are what is technically called well rooted; that is, that the colouring matter and vegetable oil is fully extracted from them. This is attained chiefly by the linens being bucked and boiled in a solution of alkali, rendered moderately caustic by quicklime, in order to preserve the fabric of the cloth from being too much reduced. The alkaline solution must be well settled, and transparent as water; because, if the lime remains either in solution or suspension in the smallest proportion, it is apt to be precipitated into the fabric of the cloth, and destroy the purity of those parts intended to be white. Linen cloth requires to be bucked and boiled from ten to twelve times in the alkaline solution; being well washed and exposed on the bleachgreen between each operation. It is soured at the end of the sixth boiling; and again soured at the end of this process, when the goods are supposed fully bleached for printing.

To ascertain whether the cloth is fit for printing, a small stripe is torn from the end of one of the pieces, and printed with one of the mordants used in the fixing of the dye. After that the mordant has remained a sufficient time in the cloth, it is rinsed in pure water to carry off the superfluous parts of the mordant, and then immersed into a copper pan in cold water, which contains a little madder; the heat is gradually increased, while the cloth is alternately raised and lowered by a bit of stick in the decoction of madder, until the colour is dyed to the shade required. At this period, if the cloth is properly bleached, the place stained with the mordant will alone have attracted the colouring matter of the madder; while the rest of the rag remains white. But should the part intended for white be stained a dirty light red, the cloth is not fully bleached, and it must again be boiled in the solution of alkali.

Cotton cloth intended for calico printing is more easily bleached than linen cloth; five, or at most six boilings in the alkaline solution, being all that is requisite for making a good white. One pound of potashes is fully sufficient to bleach a piece of calico of 21 square yards. This gives about three ounces of potash to each piece for every time they are boiled. Between every part of the boiling process, the calicoes are washed and exposed on the bleachgreen, the same as linen cloth; and soured, at the end of the process, in the same manner. In order to ascertain whether they are fully bleached for printing, the same method is followed as that which is already described for the trial of linen cloth.

In bleaching both kinds for printing, it is not customary to immerse them in the oxymuriatic solutions; except in the winter months, when a good white is not so easily obtained, by the action of the sun and air. Neither are the goods watered artificially when spread on the bleachgreen; but they are (after being well washed) allowed to lie exposed to all the vicissitudes of the season, until the common routine of business calls for their return to undergo farther operations. This process is commonly called dry bleaching, in contradistinction to that in which the goods are artificially wetted when exposed on the field.

After linen or cotton cloth is printed and dyed, a certain dulness of colour attaches itself to the parts intended to remain white; arising partly from the imperfection of the bleaching, but more frequently from a part of the mordant, which has been printed on the cloth, being loosened by the increased temperature of the water bath. This unites with the decoction of madder or other colouring matter used in the bath, and is precipitated on the parts intended to remain a pure white. To remove this partial stain in an easy manner, without long exposure upon the bleachgreen, has long been much wanted by calico printers.

In order to attain this, various methods have been resorted to without effect, arising partly from the imperfection of the substances employed. Steeping printed goods after being dyed, in the oxymuriate of lime, not only changes all the colours, and renders them of a duller hue; but also particles of the lime attach themselves so intimately to the cloth, that it acts as a discharge, and effaces the colours altogether. Although a dilute solution of the oxymuriate of potash does not act in so severe a manner as the oxymuriate of lime, yet it operates strongly as an alterative to most colours; changing the red colour to pink, and the purple and lilac are turned to bluish shades of the same colour; besides, the action of the alkali scourges the whole colours, by reducing their intensity and brilliancy. In consequence of these defects, both these substances are unfit for producing a good white on printed goods; without at the same time acting as an alterative, in completely changing the shade of colour wanted.

In searching for a substance which possesses none of these pernicious qualities, we have found, that the oxymuriate of magnesia in every respect answers in the most complete manner, not only for clearing the white ground of the goods, but also in preserving the colours of the same shade which they were originally.

Bleaching printed goods.

Of all the earths which are partially soluble in water, magnesia possesses the property of changing colours least; the alteration made by it on paper stained with litmus being scarcely perceptible. It is, therefore, peculiarly fitted, when united with oxygen, for the purpose of clearing the stain from the white of printed goods.

Plate LVI. Fig. 4.

In making this preparation, the magnesian earth must be previously broken in water, as fine as possible, in the manner of starch. It is then introduced into the receiver K of the apparatus for making the oxymuriatic acid. (See Plate LVI., fig. 4.) Into the retort A one part of good manganese is introduced, on which is poured two parts of muriatic acid, of the specific gravity of 1200, diluted with its bulk of water; the distillation instantly commences, and the magnesia is dissolved by the oxymuriatic acid. In order to keep the magnesia in suspension, it is necessary to agitate the liquor in the receiver occasionally by a staff similar to a churn staff, which is placed in the receiver, the handle coming up through the centre of the cover.

When the magnesia is dissolved, and the impurities which it may contain have subsided, it is drawn off for use. For this purpose, a clean copper is filled with pure water, and the heat is raised to about 160 or 170 degrees of Fahrenheit. So much of the oxymuriate of magnesia is then added as will give to the water in the copper a sensible taste of the salt. As soon as it is introduced, the whole must be quickly mixed together by a clean broom. The printed goods, having been previously slightly braned, are then quickly run over the wince into the copper; continuing to run them over the wince until the white is sufficiently clear. This operation takes only a few minutes. The goods are then carried to be streamed in pure water, to prevent the further action of the oxygen on the colours. By the addition of a little more of the oxymuriate of magnesia, fresh parcels of goods may be entered into the copper for clearing, and the process may be thereby continued for a whole day; after which the contents are run off from the boiler.

CHAP. V.

On Bleaching Muslin.

Bleaching muslin.

In the bleaching of the coarser kinds of muslin, such as the fabric of goods called *Jaconet*, after they have been steeped and washed, they are first boiled in a weak solution of pot and pearl ashes; after being again washed, they are twice boiled in soap alone, and then soured in very dilute sulphuric acid. Being washed from the sour, they are again boiled in soap, washed, and then immersed in the oxymuriate of potash. The boiling in soap, and steeping in the oxymuriate, is now repeated, until the muslin is a pure white. They are then soured and washed in pure spring water.

In bleaching the finer fabrics of muslin, such as those kinds called *Mull Mull* and *Book*, nearly the same process is followed as the above for bleaching of Jaconet; only that, on account of the fineness of the fabric, no pearl ashes are used in boiling, but soap alone. Otherwise, they are treated in the same manner, in being alternately washed, boiled, and steeped in the oxymuriate of potash; and when fully white, they are soured in dilute sulphuric acid.

Blea colo cottu

In the bleaching of cotton cloth, where fixed colours * are previously dyed in the yarn before it is wove into cloth, great care is necessary. Before it was customary to introduce caustic alkali into the receiver of the apparatus for making the oxymuriate of potash, the most complete uncertainty occurred with the bleacher in his attempts to bleach cotton goods wherein the most fixed colours were wove. Sometimes the colours were in tolerable preservation when the oxymuriatic acid was used in moderation; at other times, the colours were almost entirely extracted from this acid being used too strong. At last it was discovered, that when a considerable quantity of the alkali was introduced into the receiver, for the neutralizing of the oxymuriatic acid, that the fixed or permanent colours, which were immersed into it, were by no means injured. On this principle, cotton goods of the kind called Pulicates, into which fixed colours are wove, and which have thoroughly to undergo the whole process of bleaching, the colours are more brilliant than in those goods, of the same kind, which are wove along with yarns that have been previously bleached.

The common process of bleaching pulicates, into which permanent colours are wove, is, to wash the dressing or starch well out in cold water. To boil them gently in soap, and, after again washing, to immerse them in a moderately strong solution of the oxymuriate of potash; and this process is followed until the white is good: they are then soured in dilute sulphuric acid. If the goods are attended to in a proper manner, the colours, in place of being impaired, will be found greatly improved, and to have acquired a delicacy of tint which no other process can impart to them.

Pulicates, or ginghams, which have been wove along with yarn which has been previously bleached, are first freed by washing from the starch or dressing: they are then washed, or slightly boiled with soap. After which, they are completely rinsed in pure spring water, and then soured.

Besides these common processes for bleaching, another has been lately introduced with great success, by Mr John Turnbull of Bonhill-place, in Dunbartonshire, for which a patent was granted him.

This method of bleaching consists of immersing the cotton or linen goods in a pretty strong solution of caustic alkali, and afterwards exposing them to the action of steam in a close vessel, (see Plate LVI. Fig. 3.

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* By Fixed Colours are here meant, those which resist the action of the alkalis in an eminent degree, with proper treatment. The colours usually denominated fixed, on cotton, are the Turkey or Adrianople red, and its compounds of lilac or purple, by the addition of iron bases; various shades of blue from indigo, together with buff and gold colour, tinged with the oxides of iron.

A is the receiver, made of fir-deal boards firmly hooped, into which the cloth is laid loosely on the iron grating C. BB are iron hesps fixed to the side of the receiver, into which another hesp of iron, containing a screw D, is placed. This is moveable, and folds over by a joint, to make fast the cast-iron cover on the mouth of the tub or receiver: the joining of the lid is closely luted by plated rope being nailed to the mouth of the tub. The iron cover is put on its place, or removed at pleasure, by the hook of a crane being put into the ring E fixed in the centre of the lid. A hole is pierced through the cover, into which a wooden pin F is thrust, the use of which is to know when the steam is of sufficient strength.

The cotton or linen goods having been previously cleaned by steeping and washing, are, after being well drained, steeped in a solution of caustic alkali of the specific gravity of 1020. After the superfluous alkaline ley has been drained from them, they are arranged on the grating C in the receiver. The cover is then placed on the vessel, and firmly screwed down; and the steam is admitted by turning the stopcock H, of the pipe G, which communicates with a steam boiler of the common construction.

When the steam is admitted, the action of the alkali is increased by the heat, so as completely to dissolve the colouring matter of the cloth. The steaming is continued for some hours, after which the cloth is removed to the wash stocks, or dash wheel, in order to be cleansed: they are again immersed in the solution of alkali, and steamed in the receiver until they are sufficiently white; after which they are soured and washed as in common bleaching. This process of whitening cotton or linen cloth, may also be forwarded by the assistance of the oxymuriatic acid, at proper intervals.

By this method of bleaching, a considerable saving of alkali is gained, as the whole is completely saturated with the colouring matter of the cloth. Nine, or at most ten steeps in the alkali, with alternate exposure to the action of the steam bath, being sufficient to bleach linen cloth effectually: Five steeps, with exposure to the steam, is sufficient for cotton cloth.

Having thus given a succinct account of the various operations of bleaching, we shall close this article, by making such observations as seem naturally to arise from the subject.

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The first inquiry which presents itself is, What are the substances with which linen and cotton cloth is coloured? This is shown by Mr Kirwan in his excellent memoir on this subject, contained in the *Irish Transactions* for 1789.

He precipitated, by means of muriatic acid, the colouring matter from an alkaline ley, saturated with the extract from linen yarn, and found it to possess the following properties. When allowed to dry on a filter, it assumed a dark green colour, and felt clammy like moist clay.

"I took," says he, "a small portion of it, and added to it 60 times its weight of boiling water; but not a particle of it was dissolved. The remainder I dried on a sand heat; it then assumed a shining black colour; became more brittle; but internally remained of a greenish yellow, and weighed an ounce and a half.

By treating eight quarts more of the saturated ley in the same manner, I obtained a further quantity of the greenish deposit, on which I made the following experiments.

1. Having digested a portion of it in rectified spirits of wine, it communicated to it a reddish hue, and was in a great measure dissolved; but, by the addition of distilled water, the solution became milky, and a white deposit was gradually formed: the black matter dissolved in the same manner.

2. Neither the green nor the black matter was soluble in spirit of turpentine or linseed oil, by a continued long digestion.

3. The black matter being placed on a red-hot iron, burned with a yellow flame and black smoke, leaving a coaly residuum.

4. The green matter being put into the vitriolic, muriatic, and nitrous acids, communicated a brownish tinge to the two former, and a greenish to the latter; but did not seem at all diminished.

Hence it appears, that the matter extracted from linen yarn by alkalies, is a peculiar sort of resin, different from pure resins only by its insolubility in essential oils, and in this respect resembling lacs. I now proceeded to examine the powers of the different alkalies on this substance. Eight grains of it being digested in a solution of crystallized mineral alkali, saturated in the temperature of 62°, instantly communicated to the solution a dark brown colour; two measures (each of which would contain 11 pennyweights of water) did not entirely dissolve this substance. Two measures of the mild vegetable alkali dissolved the whole.

One measure of caustic mineral alkali, whose specific gravity was 1.053, dissolved nearly the whole, leaving only a white residuum.

One measure of caustic vegetable alkali, whose specific gravity was 1.039, dissolved the whole.

One measure of liver of sulphur, whose specific gravity was 1.170, dissolved the whole.

One measure of caustic volatile alkali dissolved also a portion of this matter."

From the foregoing observations of Mr Kirwan, it is evident, that the lac or resinous matter which is extracted by the alkalies from linen yarn, is in proportion to their capacity for acting upon this colouring matter; and that the vegetable alkali, whether in its mild or the caustic state, is the best solvent of this matter.

We here take the opportunity of remarking, that at most bleachfields, they are extremely defective in rendering the alkaline leys properly caustic by quicklime. Into a solution of about four hundred weight of potashes, dissolved in about 300 gallons of water, we have frequently seen only 40 or 50 pounds of quicklime used; and so imperfectly was it applied, as only to be agitated by a rake for five or ten minutes in the cold solution. Quicklime having the power of precipitating the uncombined charcoal and other impurities, the operator was satisfied, that he had given to the alkaline ley its full powers; but this is a mistake. When the alkaline ley is rendered completely caustic, nothing more is necessary but to reduce the quantity of the ley used. By this means the linen cloth will not be too severely acted upon. This process is now carried into effect by the more intelligent bleachers; and at least one-third of the alkali they formerly used is thus saved.

Method of rendering alkali caustic.

In order to render the alkali sufficiently caustic, the following process may be followed:—To two parts of potash, dissolved in hot water, add one part of fresh slaked lime, finely pulverised. After the lime is added, make the mixture boil; taking care, that it is agitated by an iron rake, to keep it from subsiding and fixing on the bottom of the boiler. After it boils, the agitation will be sufficient to keep the lime in suspension; the ebullition may be continued for two hours, and the lime allowed to subside: the clear liquor may then be run off for use, and the precipitated lime well washed with water, until it loses the alkaline taste. The washings may be kept for making fresh alkaline solutions.

On examining the quicklime which has been used, it will now be found in the state of a carbonate; having, by its superior affinity for carbonic acid, deprived the potash of this principle, which will consequently be found nearly in the caustic state.

From the experiments of Mr Kirwan, as narrated above, it will be seen, that the power of caustic potash, in dissolving the colouring and resinous matter contained in linen yarn, is at least double the power which it possesses when in the mild or carbonated state. This agrees also with the experience of every well-informed bleacher. Hence at least one-half of the alkali will be sufficient when used in the caustic state, when put in opposition to the quantity which will be required when in the mild state.

Hydrometer for alkali and acids.

As having the alkaline ley nearly of the same specific gravity, is of considerable importance to the bleacher, the hydrometer is generally used for ascertaining its strength. Formerly this useful instrument was constructed on no fixed principle, so that when one of them was broken, another could not be procured made to the same scale. This difficulty is now overcome, and the instrument may be had from Mr William Tweedale, of Glasgow, with invariably the same scale. The principle on which he constructs these hydrometers, is, that the scale commences at 1, and every degree indicates .005 of specific gravity. Hence, supposing the alkaline ley to indicate 20 degrees on the scale of the hydrometer, its specific gravity would be $1.+20\times.005=1.100$, the specific gravity of water being unity. A complete series of these, from No. 1 to 6, indicate the specific gravity of fluids from distilled water as 0, to sulphuric acid 2., the heaviest liquid known. These instruments are now used in most parts of the united kingdom.

From the increase and variable price of potash, and the dependance of Great Britain on foreign nations for this necessary article, it is of importance, that the expenditure of it be as much reduced as possible. Accordingly, various attempts have been made to recover the alkali from the strongest waste ley which had been used in the boiling of linen cloth. But the methods which have been followed for this purpose, have, in general, been given up, on account of the great expenditure of fuel necessary for evaporating the ley to a proper consistence for procuring the alkali. We shall, therefore, take no notice of the methods which have been unsuccessful; but mention one, which to us appears practicable, and which those who are interested may use with safety. It is scarcely necessary to observe, that the alkaline ley must be supposed to be of such value, as to render the recovery of the potash an object to the bleacher.

Reco of wa kali.

Plat LVI. Fig. 1. No. 1,

At some extensive chemical manufactories, where it is necessary to evaporate very large quantities of liquid to a given strength, at a small expence; in place of evaporating these solutions in iron or leaden boilers, it is found more economical to construct what are called stone boilers for this purpose. These are nothing more than large oblong chambers, the side walls of which are about two feet high, built into the ground to prevent them from giving way. The outside of the wall is well rammed with tempered clay puddle, to prevent leakage. An arch of brick is then thrown over between the walls, which is covered with mortar to retain the heat. Proper openings are, at the same time, left to examine the state of the liquid: these are covered with a plate of iron. At one end of the chamber, a furnace of a sufficient capacity is built, having a breastwork interposed between it and the liquid, over which the flame plays. At the other end of the chamber, a vent of sufficient height is built to carry off the smoke. The fire being lighted, the flame plays along the surface of the liquid, which by this means is evaporated. Some of these stone boilers are so capacious as to contain 10,000 gallons.

In evaporating waste ley for the recovery of the alkali, all that is necessary, after it has been evaporated to the consistence of tar, is, to carry it to a reverberatory furnace, of a proper construction, where, the mass being dried, it takes fire, and burns with a vivid flame. So soon as the heat is sufficiently strong, the alkali melts, and forms a liquid mass, which is run out of the furnace, by a tap-hole at the side of the furnace, into an old boiler which has been previously heated, to prevent the melted mass from sparking up, and burning the workman employed.

On examining the alkali thus procured, it will be found in a state of greater purity than when first used; because, in the incineration, every particle of the resinous and colouring matter is completely consumed, and the carbonaceous matter which it had extracted out of the cloth, reduces any sulphate of potash, which the purest imported alkali always contains, to the state of a carbonate. Hence, when the recovered alkali is dissolved and rendered caustic by quicklime, its effects in bleaching will be found equal, if not superior, to the first sort of potashes.

Another method by which potash, when used in boiling cotton goods, may be freed from a large proportion of the impurity which it contains, is, by the application of quicklime to the waste ley in the liquid state.

If, to a solution of potash, saturated with the coloured extract from cotton cloth, a proper quantity of quicklime be added, and the mixture be well agitated, a decomposition takes place, and the colouring matter is precipitated.

The extract from linen cloth, containing a greater proportion of resinous matter, is not so easily decomposed; yet, if a small proportion of fresh precipitated earth of alum be added to it along with the lime, and the mixture be well agitated, a decomposition is effected.

The impure alkaline solution is rendered caustic, and becomes transparent, although it does not entirely separate from the lac or resinous principle which it had extracted from the linen cloth. In both cases, it separates best from the extractive matter when the solution is cold; and the lower the temperature so much the better.

On account of the comparatively high price of soda, it has hitherto been very little used in bleaching. From the experiments of Mr Kirwan, already mentioned, it will be seen, that the power of soda, as a detergent, is little inferior to potash. A large quantity of barilla, an impure mineral alkali, is imported into the British islands; a considerable proportion of which was, until very lately, used by the bleachers in Ireland, who, from habit, gave it a preference to potashes. So late as the year 1800, the

quantity of barilla imported was . . .	175,629 cwt.
In 1802, ...	151,796
In 1800, the quantity of potashes imported was	135,400
In 1802, the quantity was only . . .	48,054

Barilla being, as well as potashes, a foreign product, it is a matter of no small importance to know, whether we can be supplied with alkali, of home manufacture, at a cheap rate. We do not hesitate to say, that, in a very short period, it will be completely in our power.

It is well known to every chemist, that common salt contains the mineral alkali, in the proportion of 53 parts in 100. Could the government of this country be induced to allow the soda manufacturer the free use of this salt, or of sea water, under proper restrictions, we venture to predict, that Great Britain and Ireland would soon render themselves independent of foreign nations for barilla, as well as of a large proportion of the pot and pearl ashes which are used.

The manufacture of soda, of an excellent quality, has already made rapid advances, even under the present restrictions, at London, Newcastle, and Glasgow. At the latter place, and its neighbourhood, no less a quantity than 500 tons is manufactured annually; and large establishments are daily forming for increasing this quantity. It is much to be regretted, that the manufacture of this article, which is of so much consequence to bleaching, dyeing, the manufactures of glass and soap, as well as to many other important branches of commerce, should be shackled by absurd and impolitic restrictions. (W. B.)

B L E

BLECHNUM, a genus of plants of the class Cryptogamia, and order Filices. See BOTANY. (w)

BLEEDA, a town of Africa, in the kingdom of Algiers, situated at the bottom of a ridge of mountains, which forms part of Mount Atlas. It is encompassed by a mud wall, about a mile in circuit, and has a considerable population, but little trade. See Shaw's *Travels*, p. 36. (*j*)

BLEEDING. See SURGERY.

BLEKINGEN, a mountainous province of Sweden, about 70 miles long and 26 broad, and stretching along the Baltic. It abounds in forests of oak, pine, beech, and birch. The inhabitants are chiefly employed in fishing and hunting; and they carry on a considerable trade in potash, tar, tallow, hides, leather, beams, deal boards, and masts. The shallowness of the soil renders it in a great measure unfit for cultivation. Its principal towns are, Carlscrona the capital, Carlshamn, and Solvitsborg. (*j*)

BLEMMYES, the name of a people who appear to have inhabited part of Ethiopia; and who, probably from the circumstance of depressing their heads and raising their shoulders, were represented by the ancients as without heads, and as having their eyes and mouths in their breasts. Agathemerus (c. 10. p. 49. *Geogr. Min.* i. ii.) supposes that this people inhabited the part of Ethiopia under the equator, or the vallies of the high chain of Ethiopian mountains. Demetrius of Lampsacus places them in the same region.

This barbarous people appeared in the third century, as the allies of the Egyptians against Dioclesian. "The number of the Blemmyes (says Gibbon), scattered between the island of Meroe and the Red Sea; their disposition was unwarlike, their weapons rude, and unoffensive. Yet in the public disorders, these barbarians, whom antiquity, shocked with the deformity of their figure, had almost excluded from the human species, presumed to rank themselves among the enemies of Rome. Such had been the unworthy allies of the Egyptians; and while the attention of the state was engaged in more serious wars, their vexatious inroads might again harass the repose of the province. With a view of opposing to the Blemmyes a suitable adversary, Dioclesian persuaded the Nobatæ, a people of Nubia, to remove from their ancient habitations in the desarts of Libya, and resign to them an extensive but unprofitable territory above Syene and the cataracts of the Nile; with the stipulation, that they should ever respect and guard the frontier of the empire." See Gibbon's *Hist.* chap. xiii. vol. ii. p. 114; *Strabo*, lib. xvii. p. 1, 172.; *Pomponius Mela*, lib. i. c. 4.; *Univers. Hist.* vol. xv. p. 475 (F), 491, 497; xvi. 132; xviii. 258. (*j*)

BLENHEIM, a village of Germany, in the circle of Suabia, about 25 miles to the north-west of Augsburg, has been rendered memorable in history, in consequence of the decisive defeat which the

French and Bavarians sustained in its neighbourhood from the British and their allies, on the 13th day of August 1704. The two contending armies were composed of the best and bravest troops in the service of their respective sovereigns, and were conducted by the most distinguished generals of the age. The French and Bavarians, amounting to 80,000, were commanded by Marshal Tallard and the Elector of Bavaria; and the confederates, nearly equal in number, were led on by Prince Eugene and the Duke of Marlborough. The French army was posted, in a very advantageous manner, upon the eminence of Hochstet; their right being covered by the Danube and the village of Blenheim, their left by the village of Lubzengen and the wood of Schellenberg, and their front by a large valley, which extended nearly two leagues in length, and which was intersected by several rivulets, hemmed in at some places by banks extremely steep, and at others flowing freely over a marshy plain. As this position would soon, by daily fortifications, have been rendered completely impregnable; and, as the enemy would thus have been able to lay waste the neighbouring circle of Franconia, as well as to prevent the confederates from procuring the necessary supplies of forage and provisions, as it appeared from an intercepted letter of Marshal Villeroy, that he was advancing to act in concert with the Elector of Bavaria, to ravage the country of Wirtemberg, and to obstruct the communication of the allied army with the Rhine; and as the troops of the confederates were in the highest spirits, in consequence of the victory which they had recently gained at Schellenberg, and of their having been joined by a reinforcement under Prince Eugene;—by these reasons the Duke of Marlborough was induced to run some hazard, in order to bring the enemy to a general engagement, with the utmost possible expedition; and he adapted his plan of attack, with wonderful skill, to meet the dispositions of the hostile army.

The French and Bavarians were formed into two distinct bodies. At the head of the plain, half a mile from the marshy ground, through which the confederates had to pass, 48 squadrons and 10 battalions were drawn up under the command of Marshal Tallard. Marshal de Marsin, a general of great capacity and experience, with the rest of the French, and the Elector of Bavaria, with his own troops, were stationed upon the left, nearer to the woods, and close upon one of the rivulets which flowed through the valley. In the village of Blenheim, which stood in the front of the right wing, and where it was expected that the allies would direct their principal effort, 28 battalions and 12 squadrons were posted for the defence of the place, and for the purpose of attacking the confederates in the rear, should their left attempt to advance against Tallard. To be ready to join these troops, if necessary, or to act as a corps de reserve as exigencies might require, eight more battalions were ordered to the village of Oberklaw; and a few others, at a little distance from these, were stationed near to two mills, between Oberklaw and Blenheim.

On the right of the confederate army, Prince Eugene, at the head of the Imperialists, advanced against the Bavarians, and the forces under Marsin; while the Duke of Marlborough, with the British and Dutch troops on the left, directed his attack against Marshal Tallard. The Duke, being aware of the French general's design to entice him across the plain, and to receive him in front, while the troops in Blenheim should fall upon his rear, ordered a part of his division to make an attack upon that village. This detachment, which consisted chiefly of British troops, under Major General Wilkes, began the engagement at 10 o'clock, by making a most gallant assault upon the village of Blenheim; and, though they failed in repeated attempts to dislodge the enemy, they succeeded in taking such a position in its front, as effectually blocked up the French troops which were stationed in the place, and which could only have come out in defile, through very narrow passages. The Duke of Marlborough having thus secured his rear from molestation, instantly passed the rivulet, preceded by his cavalry; ascended the hill in a firm compacted body, attacked the enemy's right wing with the utmost vigour, and, in a short time, compelled it to give way. The brave Tallard repeatedly rallied his troops as they retired, commanded ten battalions to fill up the intervals of his cavalry, made a most determined effort to regain his ground; and, by the tremendous fire of his infantry, succeeded, for a moment, in disordering the line of the confederates, and obliging them to recoil about 60 paces. But Marlborough, with the utmost promptitude, ordered three battalions of the troops of Zell to sustain his horse, renewed the charge with redoubled ardour, completely routed the cavalry of the French, and entirely cut to pieces the 10 battalions of infantry, who had been sent to their support, but who were now abandoned by their retreat. Again did Tallard succeed in collecting his broken cavalry, behind a few tents; and resolved to make the attempt to draw off the troops that were posted in the village of Blenheim. With this view he dispatched an aid-de-camp to Marshal Marsin on the left, directing him, with the troops at Oberklaw, to face the confederates without delay, in order to favour the retreat of the forces in Blenheim. Informed by that commander, that, instead of being able to spare assistance, he could with difficulty maintain his own ground; Tallard was no longer able to sustain the pressing assaults of the victorious squadrons of Marlborough. His cavalry were totally dispersed; his soldiers thrown into the utmost confusion and consternation; and the miserable fugitives driven into the Danube with dreadful carnage. Tallard himself, endeavouring to the last to rally his disordered squadrons, was surrounded at the village of Sonderen, and made prisoner, together with many officers of distinction in his army.

While these occurrences were passing on the left of the confederate army, the Prince of Holsteenbeck, in the centre, at the head of 10 battalions, passed the rivulet, with undaunted resolution, to attack Marshal Marsin at Oberklaw; but, before he could form his men on the other side, he was overpowered by numbers, mortally wounded, and taken prisoner. His division, however, supported by some Danish and Hanoverian cavalry, renewed the charge; but were repulsed a second time; and it was only by the arrival of the Duke of Marlborough in person, with some fresh squadrons from the body of reserve, that the enemy were compelled to retire. Prince Eugene on the right, having surmounted a multitude of difficulties, sustained a most obstinate opposition, and having seen his cavalry three times repulsed, had at length begun to force the enemy from their ground. The Duke of Marlborough, having completed the defeat of the enemy's right wing, had made a disposition to send him reinforcements; but, before these could arrive, the Prince had driven his opponents from Oberklaw and Lutzingen, and pursued them as far as Morsdingen and Teissenhoven. The confederates being now masters of the field of battle, surrounded the village of Blenheim, in which so large a proportion of the French army had been posted at the beginning of the engagement; and as these troops were thus cut off from all communication with the rest of their army, as well as unable to force their way through the ranks of the allies, they were under the necessity of capitulating, and surrendered themselves prisoners of war.

The success of the attack has been represented as owing in a great measure to the errors committed by the French commander, in weakening his centre by the detachment of so many troops to the village of Blenheim; in failing to advance against the right wing of the confederates, while making its way through the marshy plain; and in neglecting to drive back the attack upon Blenheim, before the Duke of Marlborough had time to form the great body of his troops after passing the valley in his front. The detention of so many of his forces in the village, which at once weakened his front and gave his opponents the superiority in point of numbers; and the distance between his wings, which were still farther separated by the confederates pressing upon their inner flanks, and forcing them to give way in opposite directions, must indeed have contributed in no small degree to the success of the allied army. But the highest praise must, nevertheless, be considered as due to the Duke of Marlborough; who concerted the previous arrangements with so much discernment; who took advantage of the mistakes of his antagonists; who rode through the hottest of the fire with the greatest intrepidity; and who issued his orders as occurrences required, with the utmost composure and presence of mind.

> 'Twas then Great Marlbro's mighty soul was prov'd,
> That, in the shock of charging hosts unmov'd,
> Amidst confusion, horror, and despair,
> Examined all the dreadful scenes of war:
> In peaceful thought, the field of death surveyed;
> To fainting squadrons sent the timely aid;
> Inspired repuls'd battalions to engage;
> And taught the doubtful battle where to rage.
>
> ADDISON'S *Campaign*.

The loss sustained in this battle by the vanquished, was immense. "By several letters intercepted, (says the Duke of Marlborough, writing to the Duke of Shrewsbury,) going from the enemy's camp at Dettingen to Paris, dated the 19th instant, they own, that this battle has cost them upwards of 40,000 men, killed, prisoners, and by the desertion since, upon their hasty march, or rather flight, towards the Rhine." Ten thousand French and Bavarians were left dead on the field; the greater part of 30 squadrons of horse perished in the Danube; thirteen thousand were made prisoners; 100 pieces of cannon, 24 mortars, 129 colours, 171 standards, 3600 tents, 300 laden mules, 15 barrels and eight casks of silver, &c. were taken by the victors. On their side 5000 men were killed, and 7000 wounded. The victory was not only complete in itself, but also most important in its consequences. Augsburg was quickly abandoned by the French, the garrison of Ingoldstadt surrendered; and the fortress of Ulm, where the elector of Bavaria had retreated with the wreck of his army, was taken after a short siege. The house of Austria was saved from impending ruin, and the face of affairs in the empire entirely changed.

Blenheim, Blight.

The following account of this memorable engagement, from the pen of Prince Eugene himself, may probably prove gratifying to our readers; and we have, therefore, kept it distinct from the above statement, which has been taken from the most approved historians. "With patience, and without fighting, Tallard and Marsin might have forced me to have abandoned Bavaria; for I had no other place than Nordlingen for the establishment of my magazines. But those gentlemen were impatient, and the elector was enraged at the pillage which I had allowed Marlborough to commit; who, by that means, was entirely with me. We loved and esteemed each other. He was a great statesman and general. They had 80,000, as well as ourselves. But why did they separate the French from the Bavarians? Why did they encamp so far from the rivulet, which would have impeded our attack? Why did they throw 27 battalions and 12 squadrons into Blenheim? Why did they disperse so many other troops in the neighbouring villages? Marlborough was more fortunate than myself in the passage of the rivulet, and in his fine attack. A little steepness of the bank made me half an hour later. My infantry behaved well; my cavalry, very ill. I had a horse killed under me. Marlborough was checked for a moment; but not repulsed. I succeeded in rallying some regiments, which had at first been shy of attacking. I led them back four times to the charge. Marlborough, with his infantry and artillery, and sometimes with his cavalry, got rid of that of the enemy, and went to take Blenheim. We were all driven back for a moment by the gendarmerie; but we ended by pushing them into the Danube. I had the greatest obligations to Marlborough for his alterations in the dispositions according to circumstances. A Bavarian dragoon took aim at me; one of my Danes luckily prevented him. We lost 9000 men; but 12,000 French killed, and 20,800 prisoners, prevented them, this time, from singing the usual *Te Deum* for their defeats; which they make it a point never to acknowledge." *Memoires du Prince Eugene.* See also, Smollet's *Hist. of England*, vol. ii. p. 23; Tindal's *Hist. of England*, vol. vi. p. 549; Somerville's *Hist. of the Reign of Queen Anne*, p. 60; *Account of the Battle of Hochstet*, London, 1704; and *Military History of Marlborough*, p. 58. (*q*)

BLIGHT. See AGRICULTURE *Index*.

BLIND.

Blind, an epithet applied to a living creature entirely deprived of the sense of sight. It belongs to medicine to point out the method of curing or alleviating this malady, in cases where it admits of cure or palliation. What we propose in this article, is, to examine the mental, rather than the bodily state of those individuals of the human species, who have been destitute of eye-sight from earliest infancy; to estimate the privations under which they labour, and the expedients by which these may be most successfully compensated; to inquire into their capacity of enjoyment, and of mental improvement; and the proper means of rendering them comfortable in themselves, and useful members of society.

Problem of Molineux.

It was put as a question, by Mr Molineux to Mr Locke, whether a person, blind from his birth, would, upon being suddenly restored to sight, be able to distinguish, by his eyes alone, a globe from a cube, the difference of which he was previously aware of by feeling? Both these gentlemen were of opinion, that the distinction could not be made by such a person by the sight till first assisted by the touch; and their conclusion seemed amply confirmed by the experience of several persons, who, having been afflicted with cataracts from their earliest years, and afterwards receiving their sight by the operation of couching, appeared at first unable to distinguish any one thing from another, however different in shape and magnitude. A very remarkable case of this kind has been detailed by Mr Cheselden, the celebrated anatomist, in No. 402. of the *Philosophical Transactions*, of a young gentleman, who was couched by him in the 13th year of his age. As it tends greatly to illustrate our present subject, as well as the general nature of vision, we shall insert its most interesting particulars, in Mr Cheselden's own words.

Account of the young man couched by Cheselden.

"Though we say of this gentleman, that he was blind, as we do of all people who have ripe cataracts, yet they are never so blind from that cause, but that they can discern day from night; and, for the most part, in a strong light, distinguish black, white, and scarlet: but they cannot perceive the shape of any thing. For the light by which these perceptions are made, being let in obliquely through the aqueous humour, or the anterior surface of the crystalline, (by which the rays cannot be brought to a focus upon the retina,) they can discern in no other manner, than a sound eye can through a glass of broken jelly, where a great variety of surfaces so differently refract the light, that the several distinct pencils of rays cannot be collected by the eye into their proper foci; wherefore, the shape of an object in such a case, cannot be at all discerned, though the colour may: And thus it was with this young gentleman, who, though he knew these colours asunder in a good light, yet, when he saw them after he was couched, the faint ideas he had of them before, were not sufficient for him to know them by afterwards; and, therefore, he did not think them the same which he had before known by those names. Now scarlet he thought the most beautiful of all colours, and of others the most gay were the most pleasing; whereas the first time he saw black it gave him great uneasiness, yet after a little time he was reconciled to it; yet some months after, seeing, by accident, a negro woman, he was struck with great horror at the sight.

"When he first saw, he was so far from making any judgment about distances, that he thought all objects whatever touched his eyes, (as he expressed it,) as what he felt did his skin; and thought no objects so agreeable as those which were smooth and regular, though he could form no judgment of their shape, or guess what it was in any object that was pleasing to him. He knew not the shape of any thing; nor any one thing from another, however different in shape or magnitude; but, upon being told what things were, whose form he before knew from feeling, he would carefully observe, that he might know them again; but having too many objects to learn at once, he forgot many of them, and (as he said) at first he learned to know, and again forgot, a thousand things in a day. One particular only, though it may appear trifling, I will relate. Having often forgot which was the cat and which the dog, he was ashamed to ask; but catching the cat, (which he knew by feeling,) he was observed to look at her stedfastly, and then, setting her down, said, *So, puss, I shall know you another time.*

"He was very much surprised, that those things which he had liked best did not appear most agreeable to his eyes; expecting those persons would appear most beautiful that he loved most, and such things to be most agreeable to his sight that were so to his taste. We thought he soon knew what pictures represented which were shewed to him, but we found afterwards we were mistaken; for, about two months after he was couched, he discovered at once they represented solid bodies; when, to that time, he considered them only as party-coloured planes, or surfaces diversified with variety of paint; but, even then, he was no less surprised, expecting the pictures would feel like the things they represented; and was amazed when he found those parts which, by their light and shadow, appeared now round and uneven, felt only flat like the rest; and asked, which was the lying sense, feeling or seeing?

"Being shewn his father's picture in a locket at his mother's watch, and told what it was, he acknowledged a likeness, but was vastly surprised; asking, how it could be that a large face could be expressed in so little room, saying, it should have seemed as impossible to him, as to put a bushel of any thing into a pint.

"At first, he could bear but very little light, and the things he saw he thought extremely large; but upon seeing things larger, those first seen he conceived less; never being able to imagine any lines beyond the bounds he saw. The room he was in, he said, he knew to be but part of the house, yet he could not conceive that the whole house could look bigger. Before he was couched, he expected little advantage from seeing, worth undergoing an operation for, except reading and writing; for, he said, he thought he could have no more pleasure in walking abroad than he had in the garden, which he could do safely and readily. And even blindness, he observed, had this advantage, that he could go any where in the dark much better than those who can see; and after he had seen, he did not soon lose this valuable quality, nor desire a light to go about the house in the night. He said, every new object was a new delight; and the pleasure was so great, that he wanted ways to express it. But his gratitude to his operator he could not conceal; never seeing him for some time without tears of joy in his eyes, and other marks of affection; and if he did not happen to come at any time when he was expected, he would be so grieved, that he could not forbear crying at the disappointment.

"A year after his first seeing, being carried upon Epsom Downs, and observing a large prospect, he was exceedingly delighted with it, and called it a new kind of seeing. And, now, being lately couched of his other eye, he says, that objects at first appeared large to this eye, but not so large as they did at first to the other; and looking upon the same object with both eyes, he thought it looked about twice as large as with the first couched eye only, but not double, that we can any way discover."

Mr Cheselden adds, in another paper printed by itself, that he has brought to sight several others, who had no remembrance of ever having seen; and that they all gave the same account of their learning to see, as they called it, with the young gentleman above mentioned, though not in so many particulars; and that they all had this in common, that, having never had occasion to move their eyes, they knew not how to do it, and, at first, could not at all direct them to a particular object; but in time they acquired that faculty, though by slow degrees.

Blind.

Account of a child couched by Ware.

Some later observations, however, of a similar kind, seem rather at variance with Mr Cheselden's conclusions concerning the first notions of vision of those who have been couched for cataracts after having been deprived of sight from their earliest years; although, perhaps, the difference may be more apparent than real. In the *Philosophical Transactions* for 1801, there is a paper on this subject, by Mr J. Ware, surgeon, who has had great practice in couching for cataracts, and who had, in this manner, restored to sight many young persons, who had no recollection of ever having seen; all of whom, however, he found had a notion of distance, and of the forms of objects, even from the very first moment that they recovered their sight. The case which he particularly describes in this paper, is that of a Master W., whom he restored to sight at seven years of age, after having been deprived of it by cataracts before he was a year old.

"I performed the operation," says Mr Ware, "on the left eye, on the 29th of December last, in the presence of Mr Chamberlayne, F. A. S.; Dr Bradley of Baliol College, Oxford; and Mr Platt, surgeon in London. It is not necessary, in this place, to enter into a description of the operation. It will be sufficient to say, that the child, during its performance, neither uttered an exclamation, nor made the smallest motion either with his head or his hands. The eye was immediately bound up, and no inquiries made on that day with regard to his sight. On the 30th, I found that he had experienced a slight sickness on the preceding evening, but had made no complaint of pain either in his head or eye. On the 31st, as soon as I entered his chamber, the mother, with much joy, informed me, that her child could see. About an hour before my visit he was standing near the fire, with a handkerchief tied loosely over his eyes, when he told her, that under the handkerchief, which had slipped upward, he could distinguish the table, by the side of which she was sitting. It was about a yard and a half from him; and he observed, that it was covered with a green cloth, (which was really the case,) and that it was a little farther off than he was able to reach. No farther questions were asked him at that time, as his mother was much alarmed lest the use thus made of his eye might have been premature and injurious. Upon examination, I found that it was not more inflamed than the other eye, and the opacity in the pupil did not appear to be much diminished.

"Desirous, however, to ascertain, whether he was able to distinguish objects, I held a letter before him at the distance of about twelve inches, when he told me, after a short hesitation, that it was a piece of paper; that it was square, which he knew by its corners; and that it was longer in one direction than it was in the other. On being desired to point to the corners, he did it with great precision, and readily carried his finger in the line of its longest diameter. I then shewed him a small oblong band-box, covered with red leather; which he said was red, and square, and pointed at once to its four corners. After this, I placed before him an oval silver box, which he said had a shining appearance; and, presently afterwards, that it was round, because it had not corners. The observation, however, which appeared to me most remarkable, was that which related to a white stone mug; which he first called a white bason, but soon after, recollecting himself, said, it was a mug, because it had a handle. These experiments did not give him any pain; and they were made in the presence of his mother, and of Mr Woodford, a clerk to his majesty's treasury. I held the objects at different distances from his eye, and inquired very particularly if he was sensible of any difference in their situation, which he always said he was, informing me, on every change, whether they were brought nearer to or carried farther from it.

"I again inquired, both of his mother and of himself, whether he had ever, before this time, distinguished, by sight, any sort of object? and I was assured by both, that he never had on any occasion; and that, when he wished to discover colours, which he could only do when they were very strong, he had always been obliged to hold the coloured object close to his eye, and a little on one side, to avoid the projection of the nose. No further experiments were made on that day. On the 1st of January, I found that his eye continued quite free both from pain and inflammation, and that he felt no uneasiness on the approach of light. I shewed him a table knife, which at first he called a spoon, but soon rectified the mistake, giving it the right name, and distinguishing the blade from the handle, by pointing to each as he was desired. He afterwards called a yellow pocket-book by its name, taking notice of the silver-lock on the cover. I held my hand before him, which he knew, but could not at first tell the number of my fingers, nor distinguish any one of them from another. I then held up his own hand, and desired him to remark the difference between his thumb and fingers; after which he readily pointed out the distinctions in mine also. Dark coloured and smooth objects were more agreeable to him than those which were bright and rough. On the 3d of January, he saw, from the drawing-room window, a dancing bear in the street, and distinguished a number of boys that were standing round him, noticing particularly a bundle of clothes which one of them had on his head. On the same evening, I placed him before a looking-glass, and held up his hand; after a little time he smiled and said, he saw the shadow of his hand, as well as that of his head. He could not then distinguish his features; but, on the following day, his mother having again placed him before the glass, he pointed to his eyes, nose, and mouth, and seemed much gratified with the sight."

Mr Ware then proceeds to compare the case of Master W. with that of Cheselden's patient, and to deduce some general conclusions, which are altogether at variance with those of that celebrated anatomist. He finds that Master W., instead of at first forming no judgment of distance, and thinking that all objects touched his eyes, was able to distinguish, at the first moment of his seeing, a table a yard and a half from him; and to prove that he had some accuracy in his idea of distance, by saying, that it was a little farther off than his hand could reach. Instead, also, of being unable to "know the figure of any thing, or any one thing from another, however different in shape and magnitude," Master W. knew and described a letter, not only as white, but also as square, because it had corners; and an oval silver box, not only as shining, but also as round, because it had not corners. These observations, he says, so contrary to the account we have received of Mr Cheselden's patient, would have surprised him much more than they did, had he not previously, in some similar instances, had reason to suspect, that children, from whom cataracts had been extracted, had a notion of distance the first moment they were enabled to see. "In the instance particularly of a young gentleman from Ireland," he subjoins, "fourteen years old, from each of whose eyes I extracted a cataract, in the year 1794, in the presence of Dr Hamilton, physician to the London hospital, and who, before the operation, assured me, as did his friends, that he never had seen the figure of any object, Dr Hamilton and myself were much astonished by the facility with which, on the first experiment, he took hold of my hand at different distances, mentioning whether it was brought nearer to, or carried further from him, and conveying his hand to mine in a circular direction, that we might be the better satisfied of the accuracy with which he did it."—"In this case, however, and in others of a like nature, although the patients had certainly been blind from early infancy, I could not satisfy myself, that they had not, before this period, enjoyed a sufficient degree of sight to impress the image of visible objects on their minds, and to give them ideas which could not afterwards be entirely obliterated. In the instance of Master W., however, no suspicion of this kind could occur; since, in addition to the declaration of himself and his mother, it was proved, by the testimony of the surgeon who examined his eyes in the country, that the cataracts were fully formed before he was a year old. And I beg leave to add farther, that on making inquiries of two children, between seven and eight years of age, now under my care, both of whom have been blind from birth, and on whom no operation has yet been performed, I find, that the knowledge they have of colours, limited as it is, is sufficient to enable them to tell whether coloured objects be brought nearer to or carried further from them; for instance, whether they are at the distance of two inches or four inches from their eyes; nor have either of them the slightest suspicion, as is related of Mr Cheselden's patient, that coloured objects, when held before them, touch their eyes."

The conclusions of Mr Ware and of Mr Cheselden, although they seem so much at variance with each other, may, in our opinion, be perfectly reconciled, upon the very simple supposition, that the patients, upon whom the observations of each were made, were affected with blindness in different degrees. Mr Ware himself informs us, that all the patients whom he had an opportunity of examining, were able to distinguish colours before they were couched; and to such a degree, as "to enable them to tell, whether coloured objects be brought nearer to or carried further from them." This being the case, it is not at all surprising, that the moment they were restored to sight they should be capable of forming a tolerable estimate of distances, and even of distinguishing forms which were simple and well defined. It does not at all appear, however, that Mr Cheselden's patient had so much use of his eyes before he was couched. He could, indeed, discriminate strong colours, such as black, white, and scarlet; but he was totally unable, as this celebrated anatomist expressly informs us, to distinguish the shape of any thing, and does not appear to have been in the least sensible when an object was brought nearer to or farther from his eyes.

As to the fact of his supposing, when he first saw, that all objects whatever touched his eyes, Mr Cheselden is also express in his testimony; and it is difficult to admit, either that so accurate an observer could have been mistaken, or that the ingenious young gentleman, whose case he describes, could have been himself deceived, or have intended to deceive others on this point. If he had no previous conception of visible distance, it is in perfect conformity to the received philosophy of vision, that he should at first be unable to form any distinct judgment concerning it; for it has been clearly shewn by Bishop Berkeley, and those who have followed him in this track of investigation, that our estimate of visible distance is not an original but an acquired faculty. That it is not like the perception of colour, or apparent magnitude and form, at once impressed upon the mind; but presupposes a complex process of mental investigation, in which we compare together a variety of particulars made known by the eye, when we look at the same object at different distances; such as its comparative distinctness or obscurity of outline, the brightness of its colours, its apparent bulk, the peculiar adjustment by which we are conscious that the eye adapts itself to a variation of distance, and the change in the inclination of the axis of the two eyes, which a change of distance requires. On account of the great rapidity with which this mental induction, or comparison of particulars, is made, in consequence of constant habit, those who have long used their eyes are altogether unconscious of its ever having taken place. But it has been proved, in a most satisfactory manner, by Berkeley and his followers, that the estimate of visible distance really depends upon such a mental investigation, or comparison; and if this be the case, it is a necessary consequence, that when a person, who has been all his life totally blind, is first restored to sight, he will, for some time, be utterly unable to judge of distances, and will naturally be inclined to believe, that the things which he sees touch his eyes, just as the things which he feels touch his skin.

We have the satisfaction to find this defence of the accuracy of Cheselden's interesting report concerning his couched patient greatly corroborated by a paper of Mr Everard Home, published in the *Philosophical Transactions* for 1807, and containing two cases of children born with cataracts, whom he restored to sight by couching. These cases are much more in conformity with the case of Cheselden's patient than those of Mr Ware, and clearly prove, that there is a considerable diversity in the degree of blindness which cataracts produce. In the first case, the sight of the patient, a boy of twelve years of age, was so obscured, that he could discern light only, but neither colours nor forms. He was only imperfectly restored to vision; but, as far as could be ascertained, he had no knowledge of visible forms after the operation, and judged all objects to touch his eyes. The other patient, a boy of seven years of age, could distinguish colours as well as light; and, therefore, had some knowledge of distance. In him the operation was completely successful; and he was so charmed with the new sense of seeing, that he took every opportunity of removing the bandage from his newly couched eye. He could distinguish distance immediately, but had long a very imperfect knowledge of forms. "A pair of scissars," says Mr Home, "was shewn to him, and he said it was a knife. On being told he was wrong, he could not make them out; but the moment he touched them he said they were scissars, and seemed delighted with the discovery. On being shewn a guinea, at the distance of fifteen inches from his eye, he said it was a seven shillings piece; but placing it about five inches from his eye, he knew it to be a guinea; and made the same mistake as often as the experiment was repeated." The account adds, that, four days after the operation, he was allowed to go about; when, on going to the window, he cried, "What is that moving?" Mr Home asked him, what he thought it was? he said, "A dog drawing a wheelbarrow. There is one, two, three dogs drawing another. How very pretty!" These proved to be carts and horses on the road, which he saw from a two pair of stairs window. At first, he called all regular shaped surfaces round; but soon learned to distinguish those that were angular.

To persons who have been totally blind from their infancy, it is altogether impossible to impart any notion or conception of light and colours; the eye being the only avenue by which such a conception can reach the mind. This notion, however, seems to be the only one, of all that immense stock of ideas which we derive from sight, that is completely beyond the reach of a blind man's capacity. Of forms, the touch communicates the most accurate information; and distance must be previously ascertained by touch, before it is made known by the eye. Even motion, the perception of which might seem peculiarly to belong to the eye, is only certainly ascertained by the touch; for the eye often considers motion to be real, when it is only apparent. If the ideas of the blind, therefore, be necessarily more limited than those of persons who see, they have the advantage of superior accuracy and precision so far as they extend.

Condition of the blind.

It is not, however, without much cultivation and care, that the blind can be enabled to make those acquisitions, by which they may possess a rational source of enjoyment within themselves, and become useful and important members of society. In that state of mental darkness to which they are naturally exposed by the deprivation of so important a sense, they are objects of the liveliest compassion; and call, from their more fortunate brethren, for all the tenderness and sympathy which enlightened humanity can impart. The language which Milton has put into the mouth of Samson Agonistes is scarcely too strong for their unfortunate condition, and was, no doubt, dictated by his own painful feelings:

> "O loss of sight, of thee I most complain!
> Blind amongst enemies! O worse than chains,
> Dungeon, or beggary, decrepid age!
> Light, the prime work of God, to me's extinct;
> And all her various objects of delight
> Annull'd, which might in part my grief have eas'd.
> Inferior to the vilest now become
> Of man or worm.
> O dark, dark, dark, amid the blaze of noon
> Irrecoverably dark; total eclipse,
> Without all hope of day!"

The appeal which the same poet makes, in his own person, to the sympathy of his readers, in the sublime address to light in his *Paradise Lost*, is, perhaps, still more pathetic and affecting:

> ——"Thus, with the year,
> Seasons return; but not to me returns
> Day, or the sweet approach of ev'n or morn,
> Or sight of vernal bloom, or summer's rose,
> Or flocks, or herds, or human face divine;
> But cloud instead, and ever during dark
> Surrounds me. From the cheerful ways of men
> Cut off; and, for the book of knowledge fair,
> Presented with a universal blank
> Of nature's works, to me expung'd and ras'd,
> And wisdom at one entrance quite shut out."

The following striking picture of the condition of the blind, is delineated by one who had the misfortune to be completely deprived of his eye-sight at the early age of five months,—the well-known and much esteemed Dr T. Blacklock of Edinburgh.

"There is not perhaps any sense or faculty of the corporeal frame, which affords so many resources of utility and entertainment, as the power of vision; nor is there any loss or privation which can be productive of disadvantages or calamities so multiform, so various, and so bitter, as the want of sight. By no avenue of corporeal perception is knowledge in her full extent, and in all her forms, so accessible to the rational and enquiring soul, as by the glorious and delightful medium of light. For this not only reveals external things in all their beauties, in all their changes, and in all their varieties; but gives body, form, and colour, to intellectual ideas and abstract essences; so that the whole material and intelligent creation lie in open prospect; and the majestic frame of nature in its whole extent is, if we may speak so, perceived at a single glance. To the blind, on the contrary, the visible universe is totally annihilated; he is perfectly conscious of no space but that on which he stands, or to which his extremities can reach. Sound, indeed, gives him some ideas of distant objects; but those ideas are extremely obscure and indistinct. They are obscure, because they consist alone of the objects whose oscillations vibrate in his ear; and do not necessarily suppose any other bodies with which the intermediate space may be occupied, except that which gives the sound alone: they are indistinct, because sounds themselves are frequently ambiguous, and do not uniformly and exclusively indicate their real causes. And though by them the idea of distance in general, or even of some particular distances, may be obtained; yet they never fill the mind with those vast and exalting ideas of extension, which are inspired by ocular perception. For though a clap of thunder, or an explosion of ordnance, may be distinctly heard after they have traversed an immense region of space; yet, when the distance is uncommonly great, it ceases to be indicated by sound; and, therefore, the ideas acquired by auricular experiment, of extension and interval, are extremely confused and inadequate. The living and comprehensive eye darts its instantaneous view over expansive valleys, lofty mountains, protracted rivers, illimitable oceans. It measures, in an indivisible point of time, the mighty space from earth to heaven; or from one star to another. By the assistance of telescopes, its horizon is almost indefinitely extended; its objects prodigiously multiplied; and the sphere of its observation nobly enlarged. By these means, the imagination, inured to vast impressions of distance, can not only recal them in their greatest extent, with as much rapidity as they were at first imbibed; but can multiply them, and add one to another, till all particular boundaries and distances be lost in immensity.

"Thus nature, by profusely irradiating the face of things, and clothing objects in a robe of diversified splendour, not only invites the understanding to expatiate on a theatre so extensive, so diversified, and so attractive; but entertains and inflames the imagination with every possible exhibition of the sublime or beautiful. The man of light and colours beholds the objects of his attention and curiosity from afar. Taught by experience, he measures their relative distances; distinguishes their qualities; determines their situations, positions, and attitudes; presages what these tokens may import; selects his favourites; traverses, in security, the space which divides them from him; stops at the point where they are placed; and either obtains them with ease, or immediately perceives the means by which the obstacles that intercept his passage to them may be surmounted. The blind not only may be, but really are, during a considerable period, apprehensive of danger, in every motion towards any place from whence their contracted power of perception can give them no intelligence. All the various modes of delicate proportion; all the beautiful varieties of light and colours, whether exhibited in the works of nature or art, are to them irretrievably lost. Dependent for every thing but mere subsistence, on the good offices of others; obnoxious to injury from every point, which they are neither capacitated to perceive nor qualified to resist: they are, during the present state of being, rather to be considered as prisoners at large, than citizens of nature. The sedentary life, to which by privation of sight they are destined, relaxes their frame, and subjects them to all the disagreeable sensations which arise from dejection of spirits. Hence the most feeble exertions create lassitude and uneasiness. Hence the native tone of the nervous system, which alone is compatible with health and pleasure, destroyed by inactivity, exasperates and embitters every disagreeable impression. Natural evils, however, are always supportable; they not only arise from blind and undesigning causes, but are either mild in their attacks, or short in their duration; it is the miseries which are inflicted by conscious and reflecting agents alone, that can deserve the name of evils. These excoriate the soul with ineffable poignancy, as expressive of indifference or malignity in those by whom such bitter potions are cruelly administered. The negligence or wantonness, therefore, with which the blind are too frequently treated, is an enormity which God alone has justice to feel, or power to punish."

That this affecting appeal should be somewhat too querulous and gloomy, will not excite the wonder of those who are aware that its author, though endowed with a powerful mind, was liable to frequent fits of despondency and extreme depression of spirits; in consequence of which, the natural evils of his situation occasionally presented themselves to his imagination, in too aggravated and distorted a form. For this, he seems anxious to apologise; when, in a subsequent part of his appeal, he exclaims: "Thus dependent on every creature, and passive to every accident, can the world, the uncharitable world, be surprised to observe moments when the *blind* are at variance with themselves, and with every thing else around them? With the same instincts of self preservation, the same irascible passions which are common to the species, and exasperated by a sense of debility, either by retaliation or defence; can the blind be real objects of resentment or contempt, even when they seem peevish or vindictive?"

The blind, however, are not without sources of consolation peculiar to themselves; of which, no one was more conscious than the amiable Blacklock, or more capable of forcibly detailing. "Their behaviour," says he, "is often highly expressive, not only of resignation, but even of chearfulness; and though they are often coldly, and even inhumanly treated by men; yet are they rarely, if ever, forsaken of heaven. The common Parent of nature, whose benignity is permanent as his existence, and boundless as his empire, has neither left his afflicted creatures without consolation or resource. Even from their loss, however oppressive and irretrievable, they derive advantages; not, indeed, adequate to recompense, but sufficient to alleviate their misery. The attention of the soul, confined to those avenues of perception which she can command, is neither dissipated nor confounded by the immense multiplicity, nor the rapid succession of surrounding objects. Hence her contemplations are more uniformly fixed upon herself, and the revolutions of her own internal frame. Hence her perceptions of such external things as are contiguous and obvious to her observation, become more lively and exquisite. Hence, even her instruments of corporeal sensation are more assiduously cultivated and improved; so that from them she derives such notices and presages of approaching pleasure or impending danger, as entirely escape the attention of those who depend for security on the reports of their eyes. A blind man, when walking swiftly, or running, is kindly and effectually checked by nature from rudely encountering such hard and extended objects as might hurt or bruise him. When he approaches bodies of this kind, he feels the atmosphere more sensibly resist his progress; and, in proportion as his motion is accelerated, or his distance from the object diminished, the resistance is increased. He distinguishes the approach of his friend from far, by the sound of his steps, by his manner of breathing, and almost by every audible token which he can exhibit. Prepared for the dangers which he may encounter from the surface of the ground upon which he walks, his step is habitually firm and cautious. Hence, he not only avoids those falls which might be occasioned by its less formidable inequalities; but, from its general bias, he collects some ideas how far his safety is immediately concerned; and though these conjectures may be sometimes fallacious, yet they are generally so true, as to preserve him from such accidents as are not incurred by his own temerity. The rapid torrent and the deep cascade, not only warn him to keep at a proper distance, but inform him in what direction he moves; and are a kind of audible cynosures to regulate his course. In places to which he has been accustomed, he, as it were, recognises his latitude and longitude from every breath of varied fragrance that tinges the gale; from every ascent or declivity in the road; from every natural or artificial sound that strikes his ear: if these indications be stationary, and confined to particular places. Regulated by these signs, the *blind* have not only been known to perform long journeys themselves, but to conduct others through dangerous paths, at the dark and silent hour of midnight, with the utmost security and exactness."

Advantages possessed by the blind.

The perfection to which the blind are capable of arriving in the use of those senses of which they remain in possession, is indeed truly admirable; and strongly manifests the bounty of nature, in providing new resources and enjoyments to compensate for any accidental deficiency. In the delicacy of their hearing and touch, the blind excel those who see, to a degree which is almost incredible; and renders them, in some respects, objects of envy. Their delicacy of ear renders them particularly susceptible of the enjoyment of music, and capable of attaining to the most consummate excellence in the practice of that delightful art. Of this, every age has afforded abundant proofs; from the rude period when *blindness* and *minstrelsy* were usually conjoined, to the present time. In the 16th century, Franciscus Salinas, a native of Burgos in Spain, who was afflicted with incurable blindness, obtained the greatest celebrity for his skill, not only in the practice, but also in the theory of music. His treatise on the scientific principles of harmony, according to Sir John Hawkins, is equal in value to any that is yet extant. Caspar Crumbhorn, a native of Silesia, and Martini Pesenti of Venice, who flourished not long after, were also blind musicians that excelled all their cotemporaries in their exquisite performance; and in their compositions both for instruments and the voice. To these we may add the well-known English organist, Stanley; who obtained the greatest celebrity in his day, both for his performance and his compositions. So delicate and susceptible was this gentleman's ear, that he was able to accompany any lesson with a thorough bass, though he had never heard it before; thus anticipating the harmony before the chords were sounded, and accompanying it in a manner suitable to its nature.

In the sense of touch, the blind have a no less striking superiority over those that see, than in the sense of hearing. Many of them have been able to distinguish the various colours of cloths and other substances, by the delicacy of their fingers alone, without any assistance from their eyes. This was the case with Stanley, already mentioned; as well as with a French lady, blind from her infancy, whose accomplishments are particularly detailed in the *Annual Register* for 1762. Dr Blacklock, however, says of himself, that though "he tried repeated experiments, by touching the surfaces of different bodies; and examining whether any such diversities could be found in them, as might enable him to distinguish colours; yet no such diversity could he ever ascertain. Sometimes, indeed, he imagined that objects which had no colour; or, in other words, such as were black, were somewhat different and peculiar in their surfaces; but this experiment did not always nor universally hold." Stanley was an expert player at cards, by means of packs which he previously prepared, by pricking them in several parts; yet so imperceptibly, that the closest inspection could scarcely discern his marks. The blind French lady likewise played at cards in this manner; she played also on the guitar; and contrived a way of pricking down the tunes, as an assistance to her memory. "So delicate are her organs," says the account, "that in singing a tune, though new to her, she is able to name the notes. In figured dances, she acquits herself extremely well; and in a minuet, with inimitable ease and gracefulness. As for the works of her sex, she has a masterly hand: she sews and hems perfectly well; and in all her works she threads the needles for herself, however small."

A still more extraordinary example of acquired dexterity, in spite of the most afflicting natural privations, was in the case of a lady, who, in consequence of a violent attack of the confluent smallpox, was completely deprived both of her sight and hearing, as well as of her speech, notwithstanding the medical aid of Sir Hans Sloane. In this deplorable condition, her touch and her smell became so exquisite, that she could distinguish the different colours of silk and flowers; and was sensible when any stranger was in the room with her. After she became blind, and deaf and dumb, it was not easy to contrive any method by which a question could be asked her, and an answer received. This, however, was at last effected by talking with the fingers; at which she was uncommonly ready. But those who conversed with her in this manner, were obliged to express themselves by touching her hand and fingers instead of their own. She generally distinguished her friends by feeling their hands; which they presented to her, when they came in, as a means of making themselves known: the make and warmth of the hand produced, in general, the differences that she distinguished; but she sometimes used to span the wrist, and measure the fingers. To amuse herself, in the mournful and perpetual solitude and darkness to which her disorders had reduced her, she used to work much at her needle; and it is remarkable, that her needle-work was uncommonly neat and exact. She used also sometimes to write; and her writing was yet more extraordinary than her needle-work: the character was handsome, the lines were all even, and the letters placed at equal distances from each other: but the most astonishing particular of all, with respect to her writing, was, that she could by some means discover when a letter had by mistake been omitted; and would place it over that part of the word where it should have been inserted, with a *caret* under it. It was her custom to sit up in bed at any hour of the night, either to write or to work, when she was kept awake by pain, or any other cause.

These circumstances were so very extraordinary, that it was long doubted whether she had not some faint remains both of hearing and sight, and many experiments were made to ascertain the fact; some of which, when she accidentally discovered them, gave her prodigious uneasiness, on account of her being suspected of insincerity. At length Sir Hans Sloane, after being permitted to satisfy himself by such experiments and observations as he thought proper, pronounced that she was absolutely blind and deaf.

If we may credit Leo Africanus, (l. 6.), there was a blind man who used to exercise the surprising office of conducting merchants through the sands and desarts of Arabia. His relation, however, is rendered far from improbable, by what Dr Bew communicates in the first volume of the Transactions of the Manchester Society respecting John Metcalf, commonly known by the name of Blind Jack, whose death has been recently announced in the newspapers. Though this man had become blind at a very early age, he followed the profession of a waggoner, and occasionally of a guide in intricate roads during the night, or when the tracks were covered with snow. At length he became a projector and surveyor of highways, in difficult and mountainous districts; an occupation that we should suppose, would be the last to which a blind man would ever turn his attention. His abilities, however, in this respect, were so great as to procure him constant employment; and most of the roads over the Peak in Derbyshire, were altered by his directions. "With the assistance only of a long staff," says Dr Bew, "I have several times met this man, traversing the roads, ascending precipices, exploring valleys, and investigating their several extents, forms, and situations, so as to answer his designs in the best manner."

In respect of intellectual advancement, and extensive proficiency in the various departments of science and literature, there are many remarkable instances on record in the annals of the blind. Dr Blacklock, already mentioned, was an excellent classical scholar, a learned divine, and a pleasing poet. The celebrated Saunderson, it is well known, though totally destitute of sight, was able to make such proficiency in mathematics, that he discharged the duties of professor of that science, in the university of Cambridge, with great applause. The smallpox had so completely destroyed his eye-sight in early infancy, that he had no perception of light; yet so delicate was his feeling, that he was sensible of the slightest vicissitudes of the atmosphere; and while he assisted in the open air, at astronomical observations, he distinguished the times at which a cloud obscured the sun, by the impression of the air on his face. In passing over with his hands a cabinet of medals, he could detect the counterfeits, even though so well executed as to deceive the eyes of a connoisseur; and he judged of the exactness of a mathematical instrument, by passing his fingers over its divisions.

No less remarkable for his scientific attainments, was Dr Henry Moyes, a native of Fifeshire; of whom the world has been but lately deprived. He also lost his sight by the smallpox, at so early a period, that he never recollected to have seen. Possessed, however, of a lively genius and an ardent application, he made great proficiency in almost every branch of liberal knowledge; and particularly in the various departments of chemistry, natural history, and natural philosophy. Mechanical pursuits were the favourite employment of his early years; and even when a boy, he was expert at the use of edged tools. When he afterwards became a lecturer on various branches of natural philosophy and chemistry, he performed most of the experiments which his course required, with his own hands, and with great neatness. He lectured also with the greatest precision and accuracy on the laws of optics, and the phenomena of light and colours; although it does not appear that his eyes had any proper perception of either. "The rays refracted through a prism," says Dr Bew (in the Manchester Memoirs), "when sufficiently vivid, produced certain distinguishable effects on his eyes. The red gave him a disagreeable sensation, which he compared to the touch of a saw. As the colours declined in violence, the harshness lessened, until the green afforded a sensation that was highly pleasing to him, and which he described as conveying an idea similar to what he felt in running his hand over smooth polished surfaces. Polished surfaces, meandering streams, and gentle declivities, were the figures by which he expressed his ideas of beauty: rugged rocks, irregular points, and boisterous elements, furnished him with expressions for terror and disgust." Dr Moyes had long abstained from the use of animal food and fermented liquors; nevertheless, he was remarkable for the chearfulness or equanimity of his temper; and greatly excelled in the charms of conversation.

That the blind should be able to discourse with accuracy on the general laws of optics, need not so greatly excite our surprise, when it is considered, that, except it be the mere perception of light and colours, these are all resolvable into the effects of impulse and attraction, in causing various deviations from the rectilineal course which luminous rays naturally pursue. Analogy, therefore, will in most cases supply the blind with means of satisfying themselves of the truth of an optical theorem. Diderot, in his *Lettres sur les aveugles, à l'usage de ceux qui voyent*, mentions an extraordinary blind man whom he had seen at *Puisaux en Gatinois*, who was accustomed to express his ideas of visible objects, and of optical relations, in this analogical manner. He defined a mirror to be "a machine by which objects are placed in relief, out of themselves;" and he called the eye, "an organ upon which the air produces the same effect, as a stick does upon the hand." This analogical mode of expression, however, will be of little or no service where the simple notion of light or of colour is alone concerned, for the communication of which there is no avenue whatever but the eye; so that, when a man who has been totally blind from his infancy, discourses concerning light and colours, thus simply considered, his language must be like that of a parrot, without appropriate ideas annexed.

Dr Blacklock, however, in his poetical productions, alludes to the various beauties of the visible world, and to the charms and delicacies of colour, with all the propriety, and with all the rapture and enthusiasm, that ever fired the breast of a poet who had the fullest enjoyment of his eye-sight. Nor was this done mechanically, or merely by rote; for having himself put it as a question, "How shall we account for the same energy, the same transport of description, exhibited by those on whose minds visible objects were either never impressed, or have been entirely obliterated?" he assures us that, "however unaccountable this fact may appear, it is no less certain than extraordinary." This paradox seems to be explained with great ingenuity, and in a very satisfactory manner, by Mr Alison in his Essays on Taste.

"That the blind," says he, "may receive the same delight from the ideas which they associate with colours that they do not see, is a fact which I think every one will be convinced of, who reads the poems of Dr Blacklock. No man who is not acquainted with the history of their ingenious author, could perceive that he had the misfortune to lose his sight in early infancy. That from conversation, and from the perusal of books of poetry, it was possible for him to learn the distinguishing colours of certain objects, and to apply them with sufficient propriety in his own verses, I do not deny; but the circumstance of importance, at present, is this, that his poetry is full of the same sentiments, and expresses the same admiration with regard to the different visible qualities of matter, with that of poets who had no such defect; and that the same power is ascribed to them in producing the emotions of beauty, and with as great accuracy with regard to particular instances, as in the compositions of those who have had the sense of sight in its fullest perfection. If our perception of the beauty of colours arose from some original fitness in such qualities to produce this emotion, it is obvious, that the blind must be as incapable of perceiving this beauty, as of perceiving the colours themselves; but if the beauty of colours arises from the associations we connect with them, this fact, in the case of Dr Blacklock, admits of a very simple solution. From reading, and from conversation, he has acquired the same associations with the words that express such colours, as we have with the colours themselves; that the word *white*, for instance, signifies a quality in objects, expressive of chearfulness and innocence,—the word *purple*, the quality of majesty,—the word *black*, the qualities of gloom and melancholy, &c. In this case, it is obvious, that he may feel the same emotions from the use of these words, that we do from the colours which they express; and that, from the permanence of these associations in a great variety of cases, he may apply the terms with sufficient propriety, either in sublime or beautiful descriptions. As this is in reality the case, it seems to be a very strong confirmation of the opinion, that the beauty of such qualities arises from the associations we connect with them, and not from any original or independent beauty in the colours themselves." Essay ii. chap. 3. sect. 2.

From the instances we have now produced, it appears sufficiently evident, that the blind are susceptible of a very high degree of intellectual improvement; and are capable of attaining skill and dexterity in many mechanical employments. That a due degree of care and diligence should be bestowed upon their education and improvement, is strongly prompted by every feeling of humanity and generosity; and is, indeed, no more than they have a right to demand, from the justice and benevolence of their more fortunate fellow creatures. It is with pleasure we add, that their claims have not been slighted nor treated with neglect; and that the present age is highly distinguished by the attention that has been bestowed, upon the most eligible means of rendering these unfortunate persons useful to themselves and to society. In London, in Edinburgh, in Paris, and in many other great cities and flourishing towns, asylums have been erected for the indigent blind; where they are not only fed and clothed by charitable contribution; but instructed in a variety of trades, such as weaving, spinning, rope-twisting, &c., which it is found they can exercise in great perfection; and where also the cultivation of their moral and intellectual faculties is properly attended to.

It is not very long ago since the prejudice against the capacity of the blind was so great, that a descendant of the celebrated Lord Verulam, Mr Nicholas Bacon, who had the misfortune to lose his eye-sight at nine years of age, and afterwards assiduously addicted himself to study, found great difficulty in procuring admission into the learned seminaries of Brabant, where he resided. This prejudice, however, he so completely overcame, that he was afterwards created doctor of laws in the city of Brussels, with high approbation; and having commenced pleading counsellor, or advocate in the council of Brabant, he had the pleasure of terminating almost every suit in which he was engaged, to the satisfaction of his clients. It may, nevertheless, be doubted, whether the profession of a barrister affords a sufficiently promising opening for the abilities of a blind man, to induce him to devote himself to such a pursuit.

We read also of a celebrated blind sculptor in the *Cours de Peint* of De Piles, who took the likeness of the Duke de Bracciano in a dark cellar, by means of moulding his face in wax; and who made a marble statue of King Charles I., with great elegance and justness: yet we would not from all this infer, that the blind are well qualified to excel in sculpture. A sufficient variety of liberal pursuits, however, will still remain within their reach, in the various departments of natural philosophy, mathematics, chemistry, theology, and the belles lettres; in all of which we have seen that they are well qualified to excel: and in the fine art of music, their eminence has been unrivalled.

A variety of expedients have been devised for facilitating the studies of the blind, and rendering that readily intelligible to the touch, which, in those who see, is addressed only to the eye-sight. It is well known, that the celebrated Saunderson had contrived for himself a machine, by which he greatly facilitated his arithmetical calculations, as well as his geometrical studies. Of this kind of palpable arithmetic, he has himself given an account; and it is much more minutely described in Diderot's Letters on the Blind, already mentioned. It consisted of a square board of a convenient size, divided by parallel lines into a considerable number of smaller squares. Each of these smaller squares, or separate departments, was pierced with nine holes, standing in three parallel rows; and by fixing a pin in one or other of these nine holes, the nine digits were denoted, according to the position of the pin. In order to facilitate his calculation, Saunderson made use of two sizes of pins, a larger and a smaller. The pins with large heads were always placed in the centre holes of the squares; and when they stood alone, without any small pins, they denoted the cypher. The number 1 was denoted by a pin with a small head, placed in the centre of a square; the number 2, by a large pin in the centre, and a small one at the side, in the hole which was first in order; the number 3, by a large pin in the centre, and a small one in the second hole at the side; and so on in order, to the number 9. By this means, it is evident that any sum could be expressed, in a number of squares corresponding to the number of its figures; and thus, all the arithmetical operations performed. Saunderson, it is said, possessed wonderful facility in the use of this machine; and was accustomed also, by means of it, to form diagrams for his geometrical demonstrations; the pins serving the purpose of making the angles of the figures, either alone, or with silk threads stretched between them.

An arithmetical machine was also contrived by Mr Grenville, who had lost his eye-sight, consisting of a square board full of holes, and ten sets of pegs of different forms, corresponding to the nine digits and cypher. But by far the most simple and commodious of these machines, seems to be that invented by Dr Henry Moyes for his own use; of which he has himself inserted an account in the *Encycl. Brit.* 3d. edit. He informs us, that when he began to study the principles of arithmetic, he soon found that a person deprived of sight could scarcely proceed in that useful science, without the aid of palpable symbols representing the ten numerical characters; and being then unacquainted with Saunderson's method, he embraced the obvious, though, as he afterwards found, imperfect expedient, of cutting into the form of the numerical characters, thin pieces of wood or metal; which being arranged on the surface of a board by means of a lamina of wax, readily represented any given number. It soon, however, occurred to him, that his notation, consisting of ten species of symbols or characters, was much more complicated than was absolutely necessary; and that any given number might be distinctly expressed by three species of pegs alone, viz. two with heads of the form of a right-angled triangle, and distinguished from each other by having a notch cut in the oblique side or hypothenuse of one of them, their other two sides being, one of them a continuation of the peg, and the other at right angles to it; and the third peg having a head of the form of a square. These pegs were to be stuck into a board of about a foot square, and divided into 576 little squares, by lines which were cut a little into the wood, so as to form a superficial groove. At each angle or intersection of the grooves, a hole was made for the insertion of the pegs. Sixty or seventy of each kind of pegs were necessary, which were placed in a case consisting of three boxes or cells, one for each set.

"Things being thus prepared," says the Doctor, "let a peg of the first set (with a plain triangular head) be fixed into the board; and it will acquire four different values, according to its position respecting the calculator. When its sloping side is turned towards the left, it denotes one, or the first digit; when turned upwards, or from the calculator, it denotes two, or the second digit; when turned to the right, it represents three; and when turned downwards, or towards the calculator, it denotes four, or the fourth digit. Five is denoted by a peg of the second set (with a notched triangular head), having its sloping side, or hypothenuse, turned to the left; six, by the same turned upwards; seven, by the same turned to the right; and eight, by the same turned directly down, or towards the body of the calculator. Nine is expressed by a peg of the third set (with a square head) when its edges are divided to right and left; and the same peg expresses the cypher, when its edges are directed up and down.—When it is necessary to express a vulgar fraction, I place the numerator in the groove immediately above, and the denominator in that immediately below the groove in which the integers stand; and in decimal arithmetic, an empty hole in the integer groove represents the comma or decimal point. By similar breaks, I also denote pounds, shillings, pence, &c.; and by the same expedient, I separate, in division, the divisor and quotient from the dividend. Coefficients and indices, in algebra and fluxions, are supplied upon similar principles."

Various attempts have been made to supply the blind with tangible musical characters, or signs, by which their progress in the acquisition of an art which affords them so great delight, and for which they are so peculiarly qualified, might be materially facilitated. We do not think, however, that these attempts have been attended with the same success, as in the case of the palpable arithmetic. In Tansure's *Musical Grammar*, p. 93., it is recommended, that the blind musician should be provided with a smooth board with ledges of deal glued on it at proper distances, to represent the five lines of the musical staff; with such additional lines as occasion may require. In these ledges, as well as in the intervals between them, a number of holes are to be drilled for the reception of a variety of pegs of different forms, intended to indicate the various kinds of notes in music; such as semibreves, minims, crotchets; together with the rests, flats, sharps, bars, &c.

In a contrivance of Mr Cheese for the same purpose, and which we have seen actually introduced into some asylums of the blind, a stuffed cushion is substituted for the board of Tansure, upon which strings are sewed to represent the musical staff, and the pegs intended to denote the various musical characters, are fixed upon sharp pointed wires, by which means they may be stuck into any required part of the cushion. What we chiefly object to this contrivance, is the multiplicity of pegs, of awkward and arbitrary forms, which it employs, the ready use of which cannot be taught to the blind without a great deal of trouble. Instead of this, we think it would be better to have the heads of the pegs formed into a resemblance of the notes, rests, bars, shakes, &c. which are actually employed in written music, which are sufficiently simple and intelligible, and far from being too numerous, as they have a relative value from their position, as well as an absolute one from their form.

In the year 1786, an *Essay on the Education of the Blind* was printed at Paris, under the patronage of the Academy of Sciences. It is the composition of M. Haüy, and does great honour to the author, on account of the comprehensive and liberal views which it exhibited. It contains a detail of a great variety of expedients by which the blind may be successfully instructed in many of the mechanic arts, as well as in music, arithmetic, geography, &c. and may even be taught to read, write, and print. In order to instruct the blind in music, at the institution of which M. Haüy communicates the details in this work, musical characters of every necessary form were cast in metal, and so many in number as to represent upon paper, by elevations on its surface, all the possible varieties that occur. In teaching geography, which was the department of M. Weissenbourg and Mad. Paradis, the circumference of countries was marked out by a tenacious and viscid matter, and the different parts of the maps was covered with a kind of sand, mixed with glass in various modes; the order of the towns being distinguished by grains of glass of a greater or less size; or, according to the plan of M. Haüy, the limits of the maps, for the use of the blind, were marked by a small rounded iron wire; and by some difference, either in the form or size of every part of a map, the pupils were assisted in distinguishing one part from another.

The manner in which the blind are taught to write and print, is as follows: The pupil, by repeated experiments, having familiarised himself to the forms of the letters as drawn in relief, both in their direct and inverted position, gradually learns to impress them upon strong paper, a little moistened, with the point of a blunt iron pen or *stylus*, which marks without piercing the paper. By this means the letters become perceptible to the touch, on the one side sunk, and on the other *in relievo*; and thus the blind may be enabled to form and decipher, not only the characters required in common language, but also mathematical diagrams, geographical plans, and all the characters employed in arithmetic, music, &c. In printing, the blind compositor has a box for every letter, on the outside of which is marked in relief, the peculiar character belonging to each. By this means he is enabled readily to choose and arrange his types, and when they are set, he makes use of a strong paper, slightly moistened, like that employed in writing, in order to render it more easily susceptible of impressions. Having laid this upon his types, by the operation of the press, or the strokes of a small hammer, he raises an impression upon the paper, which, when dry, is sufficiently obvious to the touch, to enable the blind to read by their fingers, and is so durable as to be by no means easily effaced. This method of printing, it is evident, is also legible by the eye-sight; and it has one advantage over that in common use, that the types are set, not in the reverse, but in the direct order, so that the characters may appear *in relievo*, in the same order, on the opposite side of the paper. Dr Blacklock mentions, that he was in possession of a copy of M. Haüy's Essay, which was printed in the manner now described, and also bound by the blind pupils of the Parisian institution, with great neatness. An English translation of the Essay is annexed to the edition of that gentleman's poems, printed at Edinburgh in 4to, in 1793.

See *Journal des Sçavans*, Nov. 19th 1685, which contains James Bernoulli's method of teaching mathematics to the blind. (*m*)

BLISTER. See FARRIERY, PHARMACY, and SURGERY.

BLITUM, a genus of plants of the class Monandria, and order Digynia. See BOTANY. (*w*)

BLOCK,

Block.

Is the name given to a pulley, or system of pulleys, mounted in a frame or shell, but considering them as detached from the ropes which run through them. When speaking of the block with its rope, the seaman uses the phrase of a tackle of single or double blocks; hence the term block is applied to the pulley or pullies, with its frame or shell, and its band or strap.

The ship's block consists of its sheaves or pullies, which are circular pieces of wood (usually lignum vitæ,) or sometimes brass or cast metal, with a groove, turned on its edge for the reception of the rope; and in the best blocks, called coaked sheaves, the sheave has a brass bush fitted into the centre, with a hole through it to receive the pin on which the sheave revolves. The pin is made of lignum vitæ, cocus, or a West India wood called green heart; but the best blocks have iron pins. The pin is supported by passing through the sides of the shell of the block, which is made of elm, ash, or other tough wood, with a hole morticed through it to receive the sheave, and confine it to revolve steadily though freely upon its pin, and at the same time keep the rope from getting off the groove in the edge of the sheave. When the block contains two or more sheaves, as many mortices are made. Sometimes the same pin serves all the sheaves; and at other times, the sheaves are placed one above the other, having of course separate pins. The strap is a rope, or, in some cases, a band of iron, encompassing the shell of the block, in a notch or scoring cut round the block to receive it: The strap terminates in an eye of rope, or hook of iron, by means of which one of the blocks of a tackle is attached to the object upon which it is to act as a mechanical power, while the other block is suspended from some fixed support. The former is called the running block, and the latter the standing block.

The blocks in use among shipping are so numerous, having different names according to the purposes to which they are applied, and the manner in which their straps and tackles are fitted up, that a mere enumeration of all their names would take considerable room. They may, in general, be divided into single, double, triple, and four-fold blocks, according to the number of sheaves they contain. The shells of very large blocks are made of separate pieces of wood, as the cheeks of the shell, its partitions, &c. These are called *made blocks*. The shell is formed of several pieces of elm plank, suited to the thickness of the cheeks, sheave holes, and partitions, and is strongly bolted together by three bolts at each end, driven through and riveted with a washer at the points.

Blocks are again divided into thick and thin blocks; the former being intended to receive large ropes, and the latter smaller ones. The following may serve as a general idea of the mode of making any of the common kinds of blocks in the old way, before the introduction of machinery. The shells being sawn to their length, breadth, and thickness, the corners or angles are sawn off. The workman then gauges or marks out the size of the sheave hole in the middle, one sixteenth larger than the thickness of the sheave, and once the thickness longer than the diameter, for a single sheaved block. In blocks of two sheaves, the partition is kept in the middle, and is one sixth less than the sheave hole; each sheave hole is gauged on the two opposite sides, and in the same manner for blocks with a greater number of sheaves. The blocks are then jambed up edgewise with wedges in a clave or frame, and the sheave holes are made in this manner; the length and breadth are first gauged out, and holes are bored half way through the block, along the part gauged out, with an auger of the size of the sheave hole; then the sheave hole is gauged, and bored on the opposite side in the same manner, so as to meet the opposite holes. Blocks from ten inches and upwards have one hole bored at each end, and cut through with a chisel, and the wood is sawed out with a rib saw. All blocks have the sheave holes cleared through by chisels, and by burrs at the corners. Blocks that are to have iron straps should have the strap fitted on before the wood is cut out of the middle. The hole for the pin is bored through the middle of the block, one-tenth less than the diameter of the pin. The outsides and edges of the shell are next rounded off by the stock shave, and neatly finished by the spoke shave. In the royal navy, blocks are left thick upon the edges of the cheeks; but in the merchant ships, the edges are somewhat thinned off to a small square, and somewhat rounded off. The scores, which are the grooves to receive the strap, are gauged out along the outsides of the cheeks, and tapered in depth, from nothing at the pin to half the thickness of the strap at the ends of the block for a single score, and the same on each side of the pin for double scores, which are made when the block is to have double straps. The scores are gauged down across the breast of the block to half the size of the strap, in order to allow for the serving. After the score is cut, the sheaves are fitted; they are one-tenth thicker than the diameter of the rope intended for running on them, and five times that thickness in diameter. The hole for the pin should be bored through the centre of them by a bit fixed in the mandrel of a turning lath, or with a stock and bit, and opened out with an auger one sixteenth larger than the pin, that it may easily turn. They are then put in a lath, and turned smooth, and the outer circumference hollowed one-third of its thickness, that the rope may embrace it closely. The diameter of the pin is the thickness of the sheave, and is turned in a lathe, except its head, which is left octagonal to prevent its turning in the block, and the pin is driven through the holes in the block and sheaves. After the sheaves are fitted, the inside of the sheave hole, at one end of the block, is gauged hollow to admit the rope, and correspond with the sheaves; and a small neat chamfer is taken off the edges. The following articles will explain some of the different kinds of blocks used in shipping:

Blo

Snatch block, is a single sheave, with a notch cut through one of its cheeks, to admit the rope or fall to be lifted in and out of the block without putting its end through first. (See a figure of this in Plate LVII. Fig. 1.) The strap does not in this surround the block, but is put through a hole bored through the divided end. The figure is represented with two tails, which may be made up for a hook, a thimble, or eye, according to the situation where it is to be used, which is generally for the main or fore sheet blocks of square rigged vessels. It is a convenient block for heaving any rope in the navy. The snatch blocks are iron bound, terminating at the notched end of the block, with a swivel hook or an eye bolt, large enough to receive several turns of lashing, which fastens the block to its fixed support. That part of the strap over the notch in the side lifts up with a hinge, and is confined down, when the rope is in the block, by a small pin put across through the end of the pin of the sheave, which projects up from the block sufficiently to pass through an eye made in the hinge part of the strap. The strap on the other part of the block is let into the block, and confined by the pin and some nails. These blocks are used for heavy purchases, where a warp or hawser is brought to the capstan. See Plate LVII. Fig. 2.

Deep sea line block, is a small wooden snatch block, about from nine to eleven inches long.

Cheek blocks are half shells, bolted against the mast heads; the chief bolt serves for the pin of the sheave; they receive the halyards and stays of their respective masts.

D blocks, are lumps of oak in the form of the letter D, from 12 to 16 inches long, and 8 or 10 feet wide; they are bolted to the ship's side in the channels to receive the lifts.

Long tackle block, are two single sheaves placed one above the other in the same shell. (See Fig. 3. Plate LVII.) The lower sheave is only $\frac{2}{3}$ds the size of the other; it is used in combination with a common single block, to form the long tackle, for loading, or any other purchase. In the navy and East India service they are used as yard tackles. The rope is reeved through it in the same manner as it would be through a common double block; but it is preferred where it is convenient, because the strap being in the centre of the resistance, it hangs more steadily than when the sheaves are on one pin.

Clue garnet blocks. These are single sheaves suspended from the yards by a strap with two eyes; a lashing surrounds the yard and passes through the eyes, so as to suspend the block beneath the yard; these blocks receive the clue garnets or ropes which haul up the clues of the sail; this is applied to the main and fore yard.

Clue line blocks are for the same purpose as the preceding, but applied to the top-sails, top-gallant, and sprit-sails. A great improvement has lately been made in these blocks, by Mr Brunel, inventor of the block machinery at Portsmouth. The old clue line and clue garnet blocks, (for they are the same except in size,) was a single sheave block, strapped with two eyes as above; a knot was made in the end of the clue line or garnet, just at the place where it was attached to the clue of the sail, to prevent the corner thereof being drawn into the block. This was not effective, and frequent inconvenience arose; for the sail being so constantly in motion, the rope had a great tendency to get entangled with the sail, and drawn over the sheave. The improved block in question is shewn in Plate LVIII. Fig. 1. The two holes at *aa*, are where the rope goes in and out again. The sheave is situated in the centre of the block, so as to be wholly inclosed except a mortice at *b*, where the sheave is put in. The strap surrounds the lower part of the block; then both ends pass through a hole in the upper part about *c*, crossing each other. They are then formed into an eye, by which the block is suspended from the yard. By this means no accident can happen, as the garnet, or rope, is so inclosed in the block, that it cannot be deranged by any violence, nor the sail be drawn into the block.

Plate LVIII. Fig. 1.

Main sheet block is used for the sheet tackle of the main-sail-booms of small vessels. The pin projects from each side of the block, being in all the same length as the block; the fall or rope of the tackle is belayed or twisted round this pin, to stop it. This block is either single or double, and has a hole through the end to receive its strap.

Monkey blocks are sometimes used on the lower yards of small merchant ships, to lead (into the mast, or down upon the deck) the running rigging belonging to the sails. The shells are made of ash or elm. Some are only small single blocks attached by a strap and iron swivel to iron straps, which embrace and nail to the yard the block turning to lead the small running ropes in any direction; others are nearly eight square, with a roller working in the middle, and a wooden saddle beneath to fit and nail to the yard.

Nine pin blocks are used to lead the running ropes in an horizontal direction. The shells, made of ash or elm, resemble the form of a nine-pin, though flatted on the sides. Their lengths are generally confined to the place in which they are fixed; and this is for the most part under the cross pieces of the forecastle, and quarter-deck bitts. The breadth of the block, sheave, &c. is governed by the rope, and taper at the ends to three-eighths of the breadth of the middle; the pins at each end serving as a vertical axis, is two-thirds of the size of the end. The thickness is five-eighths of the breadth. These blocks may be turned in a lathe, and flattened afterwards with a spoke sheave.

Rack blocks, are a range of small single blocks, made from one solid, by the same proportions as single blocks, with ends in form of a dove's tail for the lashing by which they are fastened athwart the bowsprit, to lead in the running ropes: they are seldom used.

Shoe blocks, are two single blocks, cut in a solid piece, transversely to each other; they serve for legs and falls of the bunt-lines, but are seldom used.

Shoulder block, is a large single block, left nearly square at the upper end of the block, and cut sloping in the direction of the sheave. Shoulder blocks are used on the lower yard arms, to lead in the topsail sheets; and on topsail yards, to lead in the topgallant sheets, and by means of the shoulder are kept upright, and prevent the sheets from jambing between the block and the yard; they are also used at the outer end of the boomkins, to lead in the fore-tackle. See Plate LVIII. Fig. 2.

Plate LVIII. Fig. 2.

Sister blocks, are similar to two single blocks, and are formed out of a solid piece, about 20 inches long, one above the other. Between the blocks is a scoring for a middle seizing: A round head is turned at each end, and hollowed underneath to contain the end seizings; along the sides, through which the pins are driven, is a groove or scoring, large enough to receive part of the topmast shrouds, in which it is seized. These blocks receive the lifts and reef tackle pendents of the topsail yards.

Spring block, a new kind of block, invented by Francis Hopkinson, Esq. of Philadelphia, and designed to assist a vessel in sailing, by increasing the acting spring of her rigging. It is proposed to apply it to all such parts of the rigging as will admit of it with safety and convenience, and where its operation will be most advantageous, but particularly to the sheet ropes, and, if practicable, to the dead eyes, in lieu of what are called the chains. A, (Plate LVIII. Fig. 3.) is a block made in the usual manner, having a ring or eye B at one end; *c* is a spiral spring linked at one end to the hook DE, and at the other to the ring F, which is to be annexed to an eye-bolt at the timber-head, or by some other means, to the place where it is to be applied. The spring *c* must be of well tempered steel, and proportioned in strength to the service it is to perform. When used, two of these blocks are employed, one attached to the timber-heads and the other to the sail. Within the cavity or pipe, formed by the spiral spring, there must be a chain of suitable strength, called a check chain, (represented in the centre of the spring,) connected by the links to the hook DE and ring F. When the spring is not in action, this chain is slack; but when the spiral spring is extended by the force of the wind, as far as it can be without danger of injury, the check chain must then begin to bear to prevent its further extension, and if strong enough, will be an effectual security against failure. The inventor of this machine apprehends, on good grounds, that a vessel thus furnished will be less liable to heel; and that she will receive the impulses of the wind to better advantage, and sail with a more lively and equable motion, than if rigged in the common way. We have never heard of its being tried; but fear the weight of a spring sufficiently strong to have any effect on a large sail, would be very unmanageable, particularly aloft, from its weight, and would also be very expensive. There is no doubt if this, or a similar contrivance, could be applied to a sail, it would have a good effect: for instance, when a ship is sailing with a certain rate, if a sudden blast of wind comes, but does not continue, it will not advance the vessel at all; because it does not continue long enough to communicate an increased momentum to so large a mass as a ship, though, at the same time, it may make her heel or pitch violently. If her rigging is fitted with these springs, she would receive the impulse of the same blast in a regular and progressive manner, which would tend to increase her velocity instead of causing her to heel. We think it would be very improper and dangerous to apply any thing of this kind to the shrouds. We recollect meeting with a similar intention, to be effected by a cylinder, fitted with a piston, which, when drawn out, would cause a vacuum, and act as a strong spring. By this means a sufficient elastic force might easily be obtained; but it would be difficult, nay, impracticable, to preserve such a cylinder in an acting state at sea, unless it were situated beneath the deck, and defended from the weather, &c., and then it could not be applied to the upper sails.

Plate LVIII. Fig. 3.

Strap bound blocks, are single blocks, with a shoulder left on each side, at the upper part, to admit the strap through a little above the pin. These blocks are used at the clues of the square-sails for the clue-garnets, or clue-lines; and under the yards, the shoulder preserves the strap from chafing.

Thick and thin, or quarter block, is a double block with one sheave, thicker than the other, and is used to lead down the topsail-sheets and clue-lines.

Although these are used for the topsail-sheets, and intended for the clue-lines, a single block would be cheaper and better, as the thin sheave is seldom used for the clue-lines, it being found rather to impede than to facilitate. Small ships in the merchant service have a double block lashed in the middle of the yard as the quarter block, through which the sheets reeve, and lead down on opposite sides. Large ships in the merchant service have a single block lashed on each side of the middle of the yard, and the sheets reeve on their respective sides, and lead down by the mast.

Block voyal or *viol*, is a single sheaved block. The length is ten times the thickness of the sheave hole, which is three-eighths more than the thickness of the sheave; the thickness of the sheave is one-tenth more than the diameter of the viol; and the diameter of the sheave is seven times the thickness. The breadth of the block should be eight times the thickness of the sheave, and the thickness two-sevenths of the length. This block is double scored, the sheave is coaked with brass, and the pin is iron, and nearly as thick as the sheave. It is used in heaving up the anchor. The viol passes round the jeer capstan, and through the block which is lashed to the main-mast, and the cable is fastened in a temporary manner to the viol in several places. It is seldom used except in the largest ships of the royal navy.

The blocks lashed to a ship's principal yards, are as follow:

To the *lower yards*. The *jeer* block; *buntline* blocks; *leech line* block; *lift* blocks and *top-sail sheet* blocks, strapped together; *quarter* and *slab-line* blocks, strapped together; *clue garnet* blocks; *tricing* blocks; *preventer brace* blocks; *pendant* blocks; *studding-sail halyards* blocks.

To the *top-sail yards*. *Buntline* and *tye* blocks, strapped together; *top-gallant sheet* block and *lift* block, strapped together; *jewel* block and *brace-pendant* blocks; *clue line* blocks, and block to lead down the *top-gallant sheets*.

To the *top-gallant yards*. *Jewel*, *clue line*, and *brace pendant* blocks.

To the *mizen-yard*. *Jeer* block; *derrick* block; *signal halyard* block; *throat brail*, *middle brail*, and *coak brail* blocks.

To the *cross-jack yard*. *Quarter* blocks; *jeer*

Block.

blocks; and *lift* and *top-sail sheets* blocks, strapped together.

To the *bowsprit*. The *bee* block, bolted to the bowsprit at the outer end under the bees; *fore bowline* blocks, lashed on each side the fore stay collar; *fore top-sail bowline* block lashed to an eye-bolt in the bowsprit cap.

Fish block, is hung in a notch at the end of the davit, and serves to haul up the flukes of the anchor to the ship's bow.

Girt-line blocks, in rigging the fore mast and main and mizen masts, are lashed round the mast-head, above the top of the cap; one to hang on each side. The girt lines that reeve through them, lead down upon deck for hoisting the rigging, tops, and cross-tree, and the persons employed to place the rigging over the mast head.

Cat block, is employed to draw the anchor up at the cat head. (J. F.)

BLOCK MACHINERY.

Block Machinery.

THE immense number of blocks employed in the navy, and the great importance of having them accurately and substantially made, in order to insure their ready performance in every unfavourable situation which the tackling of a ship is exposed to in bad weather, render the manufacture of these articles of far more importance than the generality of our readers would imagine, from the appearance of so simple an implement. Cases constantly occur at sea, in tempestuous weather, where the failure of a single block may put the vessel in imminent danger, by preventing the setting of her sails, or other important operations. At all times, the saving of labour on board a ship will be very great, from having the numerous blocks of her rigging well made; for it is well known to mechanics, that, in any system of pullies, a considerable portion of the purchase they would otherwise exert, is lost in the friction of the sheaves upon their pins, and against the inside of the shell of the block, as well as in overcoming the rigidity of the ropes; for these, if tight laid, that is hard twisted, will not readily bend over small sheaves, but will take a considerable power to force them into the sudden curvature. Hence it follows, that blocks, with small pins made of iron, the sheaves large, and coated or bushed with metal, and all points of contact of the sheaves and shell made accurately, and using slack made ropes, will be the best means of diminishing the friction, and, at the same time, rendering the apparatus durable, a circumstance of equal importance to the seaman.

These, and other circumstances, induced government in 1802, on the recommendation of General Bentham, to attend to the suggestion of Mr Mark Isambard Brunel, a gentleman who had at that time invented and taken out a patent for a complete set of machines for the manufacture of every part of ship blocks. He consequently employed Mr Maudslay of London to erect from his designs an extensive suite of machinery in the arsenal at Portsmouth, for the fabrication of these articles.

These machines were set to work in 1804, and have been in constant use ever since. They consist of 44 machines, forming in the whole the most complete and perfect system of manufacture by machinery, of any establishment which is to be met with in this kingdom, or perhaps in the whole world, at least of an article which has so many different parts to be formed in hard materials, and has such a great variety of sorts and sizes to be made by the same machines, not less than 200 kinds of blocks being manufactured at these works. The mechanical contrivance, as well as the elegant construction of the block machines, is at least equal, if not superior, to any examples of practical machinery, which we have at present contemplated for the succeeding volumes of our work. Under these circumstances, we do not think our readers will require from us any apology for extending this article beyond the bounds which the manufacture of a ship's block alone would deserve. To our mechanical readers, this article, and its accompanying Plates, will be highly acceptable, as presenting them with a number of curious machines, which may in their hands, at the expiration of the patent, be rendered applicable to a great variety of other similar operations in the mechanical arts, which are now performed by manual labour.

Before proceeding to the detailed description of the drawings of the most striking of these machines, we shall give a general outline of the operations which a block and its sheave, or shiver, are subjected to, that the connection of one machine with another may be more clearly understood. The machines are put in motion by a capital steam-engine of 32 horses' power, erected by Messrs Boulton and Watt. The whole establishment contains 44 machines, as before stated, which form three sets, that is, three blocks of different sizes may be proceeding in all their stages at the same time, though in some of these stages one machine operates at the same time upon two, or even ten blocks. The building or block mill is of great length, having the steam-engine in the centre, which therefore divides the house into three lengths: the centre, which is a large and tall house, for the engine, and two wings for the mills. One of these wings is devoted to the machinery for sawing and converting the timber into scantling, that is parallelopipedons, of the proper size to form the different blocks; this department contains seven large sawing machines. On the opposite side of the building are the machines which form the blocks and their sheaves: These are smaller and more delicate engines, being 37 in number. It is to these we shall chiefly turn our attention in this article, because they are the real block machinery; the other seven, though no less deserving of notice from their ingenuity, and perhaps superior from their general utility, are only *sawing-machines*, and equally applicable to sawing wood for any other purpose besides block making: We shall therefore take a future opportunity of presenting our readers with these, or at least the most curious among them. See Sawing *Machinery*.

To trace the whole process from the tree to the finished block, we shall commence with—No. 1. The *straight cross-cutting saw*. This is a saw operating very nearly in the same manner as the carpenter's hand-saw. The timber is brought to the mill in long trees, (of elm for the shells of the blocks,) with their sides rudely squared by the chip axe, so as to become irregular octagons in their transverse section; these are drawn by the machine upon a long horizontal bench, which is situated in the yard; and one end of the tree is brought through the window against which the machine is placed, and, being adjusted to their proper place, is cut across by the saw; exactly the proper length being cut off the end of the tree to form the shell of that kind of block for which the piece of timber seems best adapted, either as to its size or quality. This machine is only used for the largest trees.

No. 2. The *circular cross-cutting saw*, is for exactly the same purpose as the former machine, but is applied only to the smaller trees: It is a very curious piece of mechanism, difficult to be described in words. The timber is brought as before, through the window. The saw is a circle, with its axis parallel to the length of the tree. This axis is so mounted in a curious form, that it can be moved in all directions, either raised up, or moved sidewise; but in all these motions its axis continues parallel to itself, and the saw continues in the same plane. The saw continues in rapid motion by the mill; and the attendant applying the saw, by means of turning a handle, to the side of the tree, which it cuts into about one-third the diameter of the saw, and perhaps half through the tree, then he does the same on the top of the tree, next on the opposite side, and lastly beneath, if it is necessary, till the wood is quite cut across from its different sides. By this means a tree could be divided by a saw which could not be of sufficient diameter to reach through from any one side.

No. 3. The *reciprocating ripping saw*. The blocks cut by the last machine are here cut in the direction of the grain of the wood, first into two, three, or more pieces, in one direction, and then in a direction perpendicular to the former, so as to reduce the logs into the size for the scantling of the required block. This saw is on the same principle as that in common use in America and other countries, and which has often been described; but the construction of the machine is somewhat different. The largest blocks only are sawn or ripped up by this saw; the smaller ones being cut in the next machines, which are

No. 4. The *circular ripping saw*. They have four of these, each consisting of a circular saw, projecting partly up through a table similar to a carpenter's bench. The pieces of wood being applied to the saw, are cut through the length of the grain, and divided into the proper scantling, in the same manner as by the foregoing machine; but this is applied to the smaller sizes.

These are the machines appropriated for converting the timber, and occupy one of the wings of the buildings. The parallelopipedons which are formed here, are carried to the opposite wing of the mill, where the machines for forming them into blocks are situated. They are as follow:

No. 5. The *boring machines*. The blocks thus sawn out, are fixed into a frame, and two centre bits are applied; one to bore a hole for the centre pin, and the other, perpendicular to this, can be brought to bore a hole for the commencement of the mortice which is to contain the sheave; the latter borer can be so fixed as to bore either one, two, or three holes, according as a single, double, or threefold sheave block is wanted. Five of these machines are used.

No 6. The *morticing machines* are most ingenious and perfect pieces of mechanism, which might be applied to many other useful purposes; each gives motion to chisels, which mortice out the cavities for the reception of the sheaves in two blocks at the same time, if single or double blocks; but in morticing threefold blocks, only one is done at once. Three of these machines are used.

No. 7. The *corner saw* cuts off the angles of the parallelopipedons which have passed through the above machines. There are three of these machines.

No. 8. The *shaping engine* is a curious engine, in which ten blocks, previously morticed, and with their angles taken off, are fixed by their extreme ends, between the runs of two equal wheels fixed upon the same axis. These having a rapid rotatory motion given them, the blocks are successively brought against the edge of a fixed gouge, which forms the outsides of all the twelve blocks to the segment of a large circle, which they describe by their rotation with the large wheels. The gouge has also a progressive motion following the curvature the block is intended to have. When this is done, all the blocks, by an instantaneous movement, are turned half round, so that the sides which were towards the centre of the circles are now brought outside; and the whole machine being again turned about, these sides of the blocks are formed by the same means as the former. The shaping machine, therefore, forms the outside of the blocks to their proper figure. They have three of these engines for different sized blocks, though either of the machines will receive several sizes, among which the differences are small and progressive.

No. 9. The *scoring engine* forms the scoring of the blocks, which is a groove round its largest diameter, for the reception of the strap of the block. This groove is shallow, where it passes over the ends of the pin of the block, and at one end; but at the other end, it is of considerable depth. Only two of the scoring engines are required, as they will admit a great latitude of different sizes, and they perform so quickly, as to score all the blocks made by the other machines.

The foregoing machines are appropriated to the formation of the shells of the blocks. Afterwards they are trimmed, polished, and finished by hand, as the surfaces are somewhat rough, though exactly the true shape and size; and this is almost as expensive an operation as any of the preceding, not because the blocks require much to be taken off to make them smooth, but because this process cannot derive any assistance from machinery, while the expense of labour in the machine work is so exceedingly small.

We now come to enumerate those machines employed for making the sheaves. The wood for these is cut from a tree of lignum vitæ, across the grain, so as to form pieces approaching to a circular figure, and nearly the thickness of the intended sheave. These pieces are cut by two machines. The first of these,

No. 10. The *straight saw*, for converting the lignum vitæ. This is constantly moving backwards and forwards by the machinery, in a horizontal plane. The tree of lignum vitæ is fixed vertically, and raised so much above the plane of the saw as the thickness of the intended sheave; and the saw being applied to the wood, quickly cuts it through, separating a piece from the end of the tree, just the true thickness to form the sheave. This saw is appropriated to cutting out the largest sheaves, because the circular saw, to be next mentioned, would not act freely through a large and hard substance.

No. 11. The *circular saw* is for the same purpose, but is applied to the smaller sheaves. The tree is, as in the former instance, fixed in a vertical position, but upon the end of a spindle, in such a manner that it can revolve upon its own axis, and the circular saw has its axis placed vertically, and mounted in a frame which moves upon a centre, so that the saw moves in an arc of a circle, but still continues in the same plane. The saw, as it revolves, is applied against the tree, by moving it in its arc, and cuts off a thin plate. These plates are now sorted out as to the sized sheave which each will make with the least waste: They are then carried to,

No. 12. The *crown saw*. This is a saw similar to a trepan, and having a centre bit in the axis of it. The piece of wood being fixed by a neat contrivance before this saw, it is applied against the wood, and quickly cuts out a circle, and at the same time forms the centre hole, exactly in the centre of it.

No. 13. The *coaking engine* is perhaps the most ingenious of all these machines. It forms, by means which we cannot describe without the drawing, the cavity in the centre of the sheave for the reception of the coak or metal bush. This cavity is in the form of three small semicircles, arranged at equal intervals round the circular holes formed in the last machine. Two of these engines are used. The sheaves are cut by this engine, first on one side for one of the coaks, and they are then turned to have the other cut. The coaks are now inserted into the cavities cut by the coaking engines. They are cast of a mixture of copper, zinc, and tin, called gun metal, to the true shape at once, by means of an accurate pattern moulded in sand.

No. 14. The *drilling machine* is applied to perforate the three semicircular projections of the coaks; at the same time it drills through both the coaks and the wood of the sheave. The copper pins, which are put into these holes, are cut from the proper sized wire, by a simple tool fixed in the vice, all the same length. The pins being inserted into the holes, are carried to,

No. 15. The *rivetting hammers*, two small tilt hammers put in rapid motion by the machinery, for the purpose of rivetting the pins which hold the gun metal coaks into the cavity in the sheaves, made by the coaking engines. These hammers, also, by pressing on a treddle, can strike a heavier blow towards the end of the operation. The sheaves in this state are carried to,

No. 16. The *broaching engines*, of which three are used. The sheave is fixed to a vertical revolving axis, and the borer is brought down into the hole in the centre of the coaked sheave, and broaches it out to a perfect cylinder. The sheaves thus formed, require only to be turned in,

No. 17. The *face turning lathe*. This is an excellent lathe, provided with a sliding rest, which supports the turning tool, and moves it slowly across the face of the sheave, which is fixed upon the end of the spindle or mandrel of the lathe, and turned round thereby.

The blocks, shells, and sheaves, being now finished, we have to consider the iron pins for them. The small blocks, indeed, are fitted with pins of hard wood. The iron pins are first forged to the true size and shape, having a cylindrical part of sufficient length to pass through the shell of the block; and a square part, which is to be drifted into one of the cheeks of the shell, to prevent the pin from turning round. They are then taken to,

No. 18. The *turning lathe*, where the iron pins are turned by a slide rest, in a manner something similar to the facing lathe: they are then covered with spiral scratches from the scoring of the tool. These are rounded by,

No. 19. *The polishing engine*. The pin is fixed into the lower end of a vertical revolving axis, and forced down into a sort of die, immersed in oil, holding three pieces of hard steel, between which the pin is pressed as it turns, and by that means is perfectly polished.

The wood pins are cut by the circular saw into octagon pieces of the proper length. These are put into a common lathe, having adapted to it a simple tool, called a *witchit*, which quickly cuts the pin to a true cylinder, except a short piece at the end, which is left of an octagon form to be inserted into the cheek of the block, in order to prevent the pin from turning. We have not numbered this as a separate machine, because it is used in the common way of making blocks, being applied to the same lathe in which they turn the sheaves.

Besides all these machines, the block mills contain three others; one for large blocks, and two for dead eyes.

No. 20. The former is a complete *apparatus* for *boring very large holes* in any position. It is used for blocks of a size beyond what the regular machines are calculated for; some of these blocks being as large as 54 inches in length, with 4 sheaves. The shells for these are made up of pieces. They are used for the mast hulks; and by them the masts of the largest ships are suspended while they are fixed in their situation. The number of these blocks which is required, is not so great as to make it worth the expence of a set of machines for them; but the workmen avail themselves of all the assistance which they can derive from the largest of the three sets of machines, and perform the rest by hard labour. This large boring machine is the only one exclusively appropriated to large blocks.

No. 21. The *machines for making dead eyes*. After the scantling for these has been cut out by the machines before described, they are bored in the boring machine: The angles are then removed by the corner saw; and they are next put into a machine which shapes them, and cuts the score round them. They have two of these machines; the first making dead eyes from five to nine inches diameter, and the second being adapted to those from 10 to 19 inches.

Thus we have given a general idea of the objects of this really interesting mill; but a general idea of the whole is all that we can hope to give, from the limits we have been obliged to prescribe to our Plates. We shall select a few of the most curious of the machines, and give perspective drawings of them, reserving others for a future opportunity. On entering the block mill, the spectator is struck with the multiplicity of its movements, and the rapidity of its operations. The elegant structure of the small machines, strike the eye as objects of ornament as well as utility. On this score, great credit is due to Mr Maudsley for the perfection of workmanship displayed throughout these works; all the bearings, sliders, and fittings, being executed in the most accurate manner, so as to move freely, but without shake. This accuracy is essential in these machines, as they are contrived so as to adapt themselves to blocks of many different sizes and shapes; for if all the fittings were not very correct, the parts would be insufficient to restrain the large blocks, while they were clumsy and inconvenient for the small ones. This will appear from the great number of different blocks made at these mills, which are as follows:

Thick blocks, 4 varieties—single sheaves, double sheaves, treble, and fourfold. The sizes of each variety are from 4 inches to 28 inches in length; but only the three first varieties are wholly made by the machine; the fourfold, which are chiefly made with the hand, can only have the assistance of those machines which will form their parts: their sheaves and pins, however, are completely made by the machines. These make about	72 sizes.
Thin blocks are the same, but with narrow sheaves: these run from 6 to 26 inches in length,	48
Clue garnet and clue line blocks are of a peculiar construction, introduced by the inventor of the machinery. (See the article BLOCK)	10
Sister blocks,	20
Top sail sheet blocks,	20
Fiddle or viol blocks,	24
Jack blocks,	20
	214

It may therefore be safely said, that not less than 200 sorts and sizes of blocks are constantly making by these machines.

It will give some idea of the expedition of these works, to state the number of block shells of different sizes, made by each set of machines in a day.

The first set of machines make blocks from 4 to 7 inches in length, at the rate of 700 per day. These have wooden pins.

The second set from 8 to 10 inches in length, at the rate of 520 per day. These have iron pins.

The third set from 11 to 18 inches in length, at the rate of 200 per day, with iron pins. So that all the machines will make 1420 per day.

The larger sizes, from 19 to 28 inches, are not so frequently wanted as to employ the machines constantly: indeed they cannot make these large blocks by the machines alone, though they perform particular parts with them, as the sheaves, pin, and cheeks.

Having now enumerated the number and objects of these machines, we shall proceed to describe each of them in the same order.

The *straight cross cutting saw*. The log is placed horizontally on a very low bench, which is continued through the window of the mill into the yard. A horizontal shaft, turned by the mill, is situated over head, with a crank in it. The crank rod descends to the horizontal arm of a bent lever, whose centre is rather below the floor. The upper end of the vertical arm of this lever is jointed to the saw, which will therefore rise and fall on its joint in a vertical plane. It is a large pit saw without any frame, placed horizontally, its teeth downwards, but sloped so as to cut when drawn towards the lever. Over the back of the saw a piece of wood is fixed, and when the saw is lifted up upon the joint connected with the lever, so as to be at its most elevated position, the back of its blade is received into a kerf or cleft cut in this fixed piece of wood. The end of the saw, opposite to that by which it is jointed to the lever, has a handle or spar fixed to it in a straight line with the blade: this spar, which may be called its handle, is received between two vertical posts, which confine it to move straight, but allow it to rise or fall. By a rope attached to this pole and conducted over a pulley, the attendant lifts up the saw into the cleft, in the fixed piece or guide before mentioned, (we suppose the saw is not now in motion, the crank being cast off from the mill,) then by a windlass and lever he draws the log forward on the platform, till the end of it (which we suppose has been cut off square by the same process we are about to describe) comes in contact with a lump of wood screwed upon the platform. The saw is now exactly over the place where the log is to be divided. It is let down and suffered to rest with its teeth upon the log, the back still being in the cleft of the guide. The crank being set in motion, the saw reciprocates backwards and forwards with exactly the same motion as if worked by a carpenter, and quickly cuts through the tree. When it first begins to cut, its back is in the cleft in the guide, and this causes it to move in a straight line; but before it gets out of the guide, it is so deep in the wood as to guide itself: for in cutting across the grain of the wood, it has no tendency to be diverted from its true line by the irregular grain. When the saw has descended through the tree, its handle is caught in a fixed stop, to prevent its cutting the bench. The machine is cast off, the attendant lifts up the saw by the rope before mentioned, removes the block cut off, and advances the tree forwards to take a fresh cut. The lump of wood before mentioned can be fixed at any place along the platform, so as to cut any required length off the end of the tree. It should be mentioned, that a lever is placed across the end of the tree; one end turning on a pin fixed in a firm post, and the other so loaded, as to keep the piece steady upon the bench when it is nearly or quite cut through. The under side of the lever is fitted with large teeth, which penetrate into the tree and hold it. This is a very simple and effective machine; but does not cut so quickly as the circular saw which follows, because it does not admit of such a rapid motion; but it can be constructed to cut trees of very large dimensions at a small expence.

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The *circular cross cutting saw.* The reader must figure to himself a frame formed of two long parallel spars of wood, united by cross bars and braces; this, which we call the saw frame, is suspended vertically by one end, where it is jointed to the end of a similar frame, (say the upper frame,) poised nearly horizontally, on an horizontal axis which passes through it near the middle of its length. The end opposite that which supports the saw frame is loaded, so as to counterpoise its weight. At the lower end of the saw frame, the spindle of the saw is mounted, by its bearings being bolted on the spars of the frame. The saw is fixed on the extreme end of the spindle, so as to be on the outside of the spars. The spindle is parallel to the axis of the upper frame. The tree is placed on a bench, and drawn up to a stop by a windlass, just the same as in the foregoing machine, and is kept steady by a crooked bar in a similar manner. The tree lies in a direction parallel to the axis of the saw. Now it will be seen by this arrangement, that the saw possesses universal motion; but the axis is always parallel to itself, and the saw in the same plane. It can be raised up or lowered down, by inclining the upper frame on its axis; and to move it sidewise, the saw frame must swing sidewise on its joints, which connect it with the upper frame. These movements are effected by two winches, each furnished with a pair of equal pinions, working a pair of racks fixed on two long poles. The spindles of these winches are fixed in two vertical posts, which support the axis of the upper frame. One of these pair of poles are jointed to the extreme end of the upper frame; therefore by turning the handle belonging to them, the frame and saw is elevated or depressed: in like manner, the other pair are attached to the lower part of the saw frame, so that the saw can be moved sidewise by means of their handles, which then swing the saw from its vertical position.

These two handles give the attendant a complete command of the saw, which we suppose to be in rapid motion, the tree being brought forwards and properly fixed. By one handle, he draws the saw against one side of the tree, which is thus cut into, (perhaps half through;) now, by the other handle, he raises the saw up, and by the first-mentioned handle he draws it across the top of the tree, and cuts it half through from the upper side; he then depresses the saw and cuts half through from the next side; and lastly a frifling cut of the saw, as the lower side completely divides the tree, which is then advanced to take another cut. The strap for the saw is conducted over pullies, two of which are fixed on the upper frame near its horizontal axis; and it then turns a pulley, fixed on an axis concentric with the joint, connecting the two large frames. On the same axis is another equal pulley, around which the strap is passed, which turns the pulley on the spindle of the saw. By this means, the strap never becomes slack in any movement of the saw, as its points of flexure are the same as the frames. This machine is very ingenious, and acts with great accuracy, and astonishing rapidity.

The great reciprocating saw.

The *great reciprocating saw* is on the same principle as the saw mill in common use in America, at least the differences are so small, that they cannot be explained without drawings; and as this machine is by no means essential to the manufacture of blocks, we shall refer our readers to the article SAWING *Machinery*.

The circular ripping saw.

The *circular ripping saw,* is a thin circular plate of steel, with teeth similar to those of a pit saw, formed in its periphery. It is fixed to a spindle placed horizontally, at a small distance beneath the surface of a bench or table, so that the saw projects through a crevice a few inches above the bench. The spindle being supported in proper collars, has a rapid rotatory motion communicated to it by a pulley on the opposite end, round which an endless strap is passed from a drum placed overhead in the mill. The block cut by the preceding machine, from the end of the tree, is placed with one of the sides flat upon the bench, and thus slides forward against the revolving saw, which cuts the wood with a rapidity incredible to any one who has not seen these or similar machines. The wood is guided in its progress toward the saw by a large parallel ruler, similar to that used for drawing, which can be placed and fixed at any required distance from the plane of the saw, but is always parallel to it: by this means the circular saw becomes a general machine, and can be adapted to cut any required width. Its great advantages are, the saving of labour, and the great accuracy of its performance, as it invariably cuts a perfectly plane surface; and it is evident that any number of pieces cut by it must be of precisely the same size, when the parallel ruler remains fixed at the same point. This is an important circumstance in these works, as the accurate performance of many, or indeed all the machines, depends upon the blocks which are submitted to them, at the same time, being of one size. We have not given these sawing machines among our Plates in this article, because this saw is in constant use for sawing in general, and will therefore come more properly under SAWING *Machinery*, where we propose to explain this, or a similar one constructed by Mr Maudslay, who has a peculiar mode of making the collars for the axis of the saw, which succeeds remarkably well. It is a great improvement upon the usual mode of fitting up the circular saw, and which, we believe, was first introduced (at least for sawing large timber) by Mr George Smart of London. In the old method, the ends of the spindle were perforated with small conical holes, and the conical points of two fixed screws were inserted into them. All the points of contact were made of steel, and hardened. Nothing could be more perfect or easy than the movement of such a spindle, until it was put into rapid motion by the machinery, when, having a considerable strain on the pivots from its work, it required a constant supply of oil, which was very quickly consumed, as the centrifugal force tended to draw the oil up the largest part of the cone, and consequently take it from the points of contact. If the machine continued to work without oil, the great velocity and pressure would cause such a friction, as to warm one or other of the steel joints. This would at once expand and soften it, so as to increase the friction in a two fold degree; and if this evil continued, the point would suddenly become red, or even white hot, and being too soft to resist the power of the saw, would then be twisted off. The broken point when cold, would then be found so jambed, or rather welded, into the hole in the end of the spindle, that it would be impossible to get it out except by drilling. The improved spindles, as constructed by Mr Maudslay, have double conical sockets, so disposed as to attract the oil into the fitting, instead of throwing it out. For small saws, where the strain is but slight, the old method is as good as can be devised. The blocks applied to the ripping saw are first split or ripped, in the direction of the grain, into the proper breadth in one direction, and then in the other, so as to reduce them to the proper scantling for the various sizes of blocks.

Boring machine.

PLATE LVII. Fig. 4.

Boring machine. The blocks, prepared by the foregoing saws, are placed in the machine represented in Plate LVII. Fig. 4. This machine has an iron frame, AA, with three legs, beneath which the block is introduced, and the screw B being forced down upon it, confines it precisely in the proper spot to receive the borers D and E. This spot is determined by a piece of metal fixed perpendicularly just beneath the point of the borer E, shewn separately on the ground at X: this piece of metal adjusts the position for the borer D, and its height is regulated by resting on the head of the screw x, which fastens the piece X down to the frame. The sides of the block are kept in a parallel position, by being applied against the heads of three screws tapped into the double leg of the frame A. These screws are represented by dotted lines in the Figure. The borer D is adapted to bore the hole for the centre pin in a direction exactly perpendicular to the surface resting against the three screws; the other, at E, perforates the holes for the commencement of the sheave holes. Both borers are constructed in nearly the same manner; they are screwed upon the ends of small mandrels, mounted in frames similar to a lathe. These frames, G and H, are fitted, with sliders upon the angular edges of the flat broad bars, I and K. The former of these is screwed fast to the frame; the latter is fixed upon a frame of its own, moving on the centre screws, at L L, beneath the principal frame of the machine. By this means, the borer E can be moved within certain limits, so as to bore holes in different positions. These limits are determined by two screws, one of which is seen at a, the other being on the opposite side. They are tapped through fixed pieces projecting up from the frame. A projecting piece of metal, from the under side of the slider K of the borer E, stops against the ends of these screws, to limit the excursion of the borer. The frames for both borers are brought up towards the block by means of levers M and N. These are centered on a pin, at the opposite sides of the frame of the machine, and have oblong grooves through them which receive screw pins, fixed into the frames G and H beneath the pulleys P, P, which give motion to the spindles.

Meth
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In using this machine, the workman draws back both borers, which always continue turning: He then takes the block and applies one of its sides against the heads of the three screws, resting it on the head of the screw x above mentioned, and thrusts it against the stop X. This ascertains the true position; and the screw B being screwed down upon it, holds it perfectly fast. The point of this screw has a steel ring, or washer, fitted upon it, the lower side of which is a sharp edge. When the screw is twirled round, the balls at the ends of its cross handle cause it to act as a fly-press, to stamp the impression upon the end of the block. The workman now takes the handles M, N, and forces them towards the block. This brings the borers against it; and, as they are in rapid motion, they will bore as fast as they can be followed up to the work. This is the process of boring a single sheave block, when the screw-stops at a are screwed so far as to confine the frame K in a vertical position, and then its borer makes a hole through the centre of the block. For a double block, the screws are withdrawn so far, that when the frame is held against one screw, its borer will be in the proper place for one hole; and, when inclined to the other screw, will be in the proper place for the other hole; and it is evident, that these limits, or the distance between the holes, may be increased or diminished at pleasure, to suit thick or thin blocks. The borers, which are made in the same form as a carpenter's centre bit, can be unscrewed, near the ends of their respective spindles, at b, to put on one of a larger or smaller size. The points of the screw-centers at L, upon which the frame of the borer E vibrates, can be put into different holes in the frame, so as to alter the difference of the level between the two borers, in order to suit blocks of different dimensions; and the screw x is changed for one with a thicker head, or, what is the same, a washer is put under its head. The stop X can be altered in its position, by sliding it farther from or nearer to the frame, and can be fastened by the screw x. Threefold blocks are bored at one operation, by the machine set in the same manner as for single blocks: They are then put in the machine when set for double blocks, and the two external holes bored.

Morti
machi

PLAT
LVII
Fig. 4

The *mortising machine*, is exhibited in Plate LVIII. Fig. 4. which is a perspective view of this beautiful piece of mechanism. It is put in motion by an endless strap passing round a drum at A, screwed to a fly-wheel B, that regulates the movement. This drum turns an axis D, on the extreme end of which is a crank. This has a long rod extending from it up to a joint at a, which connects it with a frame EE, fitted between sliders b, d, and guided by a cylindrical rod F, sliding through a fixed collar supported by the framing. By this means the frame is moved up and down when the axis D revolves. To this frame the chisels are fastened, and operate upon the block fixed at G, in a carriage H, sliding horizontally in the frame of the machine. *e*, *e*, *e*, are three screws, the same size as the screw of the boring machine, and each furnished with the same sized ring at its end. This enters the impression made by the boring machine, so as to fix the block in its proper position when the screw is turned. This forces the other end of the block against a cross bar of the carriage, shewn separately on the ground at Y. It has three steel circles, or rings, *f*, fixed to it opposite the ends of the screw *e*. Each of these rings includes two smaller rings, also made with a sharp edge. Now the pressure of the screw *e* forces the block against these rings, so as to print their impression in the wood; and by this means the block is held quite fast in the carriage while undergoing the process of mortising. The carriage has a large double wormed screw R attached to it behind, and this is received through a nut, or female screw, which is fitted to turn round in a fixed collar, supported by a bar extended across the frame of the machine. To this nut two wheels *g*, *h*, are fixed; the former is a large ratchet wheel, the latter a cog wheel, which has a smaller one geering with it. This is fixed on the end of a long axis *k*, on the extremity of which is a winch *r*. When this is turned round by the attendant, the nut of the screw is turned at the same time, and the carriage moved slowly, either backwards or forwards. This motion is only intended to adjust the carriage to the proper point of commencement. The gradual advancement of the block to each cut of the chisel, is produced by turning the ratchet wheel *g* in this manner:—The axis D has an eccentric circle I fixed upon it; which, as it revolves, acts upon a roller K, fixed in one arm of a bent lever, which cannot be wholly seen in the view: the other end of this arm has a rod *m* jointed to it, having a tooth in the middle, which engages the teeth of the ratchet wheel, and turns it round a tooth at a time, as the rod reciprocates backwards and forwards. The extreme end of this rod rests upon a lever *n*, (except when it rises up by being drawn over the sloping side of the tooth of the ratchet wheel,) the centre of which is a pin fixed in the vertical column of the frame. It is held up by a second lever *o*, supported on a cock screwed on the frame. The opposite end of this lever is made so thick and heavy, that the weight of it is sufficient to raise up *n* and *m*, so that the tooth of the latter will be too high to intercept the teeth of the ratchet wheel in its motion. The heavy end of the lever is kept up by a piece of metal fastened to the side of the carriage at *p*. The screws which fasten this, pass through oblong grooves in it, so that it can be fixed at different parts along the length of the carriage. By this means when the carriage has advanced as far as intended, the loaded end of the lever *o* falls off the piece *p*, and disengages the rod *m* from the ratchet wheel. The fly-wheel and drum which turns the machine, are, as before mentioned, screwed together; but they are fitted on a cylindrical part of the axis, so as to turn freely thereon, when it is not required to turn the axis D, and work the machine. A conical wheel S, having a hollow axis or tube centre piece, is fitted upon the axis D, so as to slide freely endwise, but is confined to revolve at the same time by fillets inserted into it. The end of the tube of the wheel S is formed into a circular groove, which is embraced by a forked lever L, centered in the opposite side of the frame. Now by moving the end of L towards the fly-wheel, the conical wheel S is thrust forwards, and jambed into the inside of the drum A. This exactly fits the wheel; and the friction caused by the contact of the two conical surfaces, is sufficient to work the machine. On the other hand, when the lever L is pulled away from the fly-wheel, the conical wheel is drawn out from the rigger, and by that means the fly-wheel is detached from the axis, so as to revolve upon it freely without turning it; but, to prevent any danger of the axis being turned by the friction of the fly-wheel upon it, the wheel S has another cone formed on the back of its rim, the bases of the two being conjoined. When the wheel is drawn back, this cone is jambed into a fixed ring M, supported by the frame of the machine, so as to be fixed fast, and prevent the axis from turning.

Method of using the mortising machine.

The mortising machine is used in the following manner: The block brought from the boring machine has the print formed by the screw thereof applied to the end of one of the screws at *ee*. If one double or threefold sheave block is to be mortised, as shewn in the Figure, the centre screw alone is used to hold it in; but if two single sheaves are to be fixed in, then only the outside screws are used, the centre one being left loose. By screwing it tight, the block is fixed between the double circle prints, before mentioned, on the bar Y; and stops are situated on the same bar. To guide the block to its proper position, which is, that the hole bored for the commencement of the sheave hole shall be vertical, suppose the block fixed, the handle *r* is turned till the hole is brought beneath the sliding frame. The chisels are now adjusted. These are long square bars of steel TT, and are fastened to the frame by a clamp, seen separately at X. This goes behind the cross bar of the frame, and has two square holes through its ends, to receive the chisel T, and two screws to bite it fast in the square holes; at the same time that this keeps the chisels from slipping up and down, it fixes them fast to the frame EE, by drawing the chisels forcibly against the cross bars, by means of the clamps behind them. The two screws of each clamp being slackened, the chisels are put exactly over the holes which are to become sheave holes, and screwed fast. The machine is now put in motion by depressing the handle P. This is at the end of a lever, the fulcrum of which is a pin fixed in the column of the frame at *s*; and a short arm gives action to the end of the lever L, before described, so as to put the machine in motion. At the first descent of the chisels, they cut down through the whole depth of the holes previously bored, so as to give them a flat side when they rise up. The eccentric circle I, moving the bent lever and rod *m*, turns the ratchet wheel round on both, and advances the block a very minute quantity towards the fly wheel; so that the chisels in descending cut a fresh space, and in ascending the block advances. In this manner it proceeds, with a most astonishing rapidity, through the whole length of the intended sheave hole. At this time, the loaded end of the lever *o* drops off the piece *p*, previously adjusted, and raises the rod *m*, so that the farther advance of the

PLATE LVIII. Fig. 4.

block is prevented. When the boy who attends the machine observes this, he raises the handle P. This stops the machine, as before stated; and the boy takes care to stop it when the chisels are at the highest point, which he effects by a very dextrous movement. The finished block is now removed, and a fresh one put in; the handle *r* is screwed back, to bring the block to the proper point, and the machine starts, and proceeds as before.

The backs of the chisels have a small piece of steel *t* fixed to them, which thrusts out the chips which they cut, otherwise these would accumulate and wedge up the hole, so as to obstruct the chisel most materially, by filling up the space behind it. It has also two small cutters, called scribers, at *vv*, fixed perpendicular to its edge, so as to project rather before it, being fitted in dovetail notches, formed in the sides of the chisels. These small scribers, in the descent of the chisel, cut or scribe two small clefts, which include the width of the chip which will be cut out by the chisel in the succeeding stroke. By this ingenious device, the mortice cut in this machine has its sides as smooth as if they were made by a plane. The back of the chisel is rounded, to conform to the hole bored in the boring machine.

To adapt the mortising machine for different sized blocks, the cross bar Y, in the back of the carriage, against which the blocks are pressed, can be fixed by notches cut in the frame, at one inch asunder, so as to hold all blocks of different lengths, having an inch difference in each. The stops, above mentioned, to ascertain the position of the block, can be fixed upon the cross bar at any point, either as to height or position sidewise, in the following manner: The piece of iron *w*, (see the separate view,) with a groove through it, carries two vertical pieces *xx*, at the upper and lower end of which is a knob; these will place the sides of the blocks applied against them truly vertical. Two small pillars *nn* are fixed to the cross bar of the carriage; they have a piece sliding upon them, which can be fixed at any height by screws, to adapt it for different sized blocks. The two pieces *xx*, are fixed at the same distance asunder as the screws in the front of the carriage; so that when one is set in the position for a block, to be held by one screw, the other will be at the proper place for the other screw: by these means the carriage can be adapted to receive a block of any dimentions, and can guide it to its proper position against the prints in the cross bar. The frame E may have any number of chisels fixed to it, corresponding to the number of mortises intended to be cut.

Plate LVIII. Fig. 4.

Corner saw.

Plate LVII. Fig. 5.

The *corner saw* (see Fig. 5. of Plate LVII.) consists of a mandrel mounted in a frame A, and carrying a circular saw L, upon the extreme end of it. This mandrel and its frame being exactly similar to those at G and H, Fig. 4. Plate LVII. does not require a separate view, although it is hid behind the saw, except the end of the screw marked A. This frame is screwed down upon the frame BB of the machine, which is supported upon four columns. CC, DD is an inclined bench, or a kind of trough, in which a block is laid, as at E, being supported on its edge by the plane CC of this bench, and its end kept up to its position by the other part of the bench DD. By sliding the block along this bench, it is applied to the saw, which cuts off its angles, as is evident from the Figure, and prepares it for the shaping engine. All the four angles are cut off in succession, by applying its different sides to the trough or bench. In the figure, two of them are drawn as being cut, and the third is just marked by the saw. This machine is readily adapted to different sizes of blocks, by the simple expedient of laying pieces of wood of different thickness against the plane DD, so as to fill it up, and keep the block nearer to or farther from the saw; for all the blocks are required to be cut at the same angle, though, of course, a larger piece is to be cut from large than from small blocks. The block reduced to the state of E is now taken to

Shapi machi Plat LIX.

The *shaping machine*, represented in Plate LIX. as it is seen from one side. A great deal of the apparent complication of this figure arises from the iron cage which is provided to defend the workman, lest the blocks, which are revolving in the circles, or chuck, with an immense velocity, should be loosened by the action of the tool, and fly out by their centrifugal force. Without this provision, the consequences of such an accident would be dreadful, as the blocks would be projected in all directions with an inconceivable force. The principal part of this machine is its chuck, which holds the blocks. This consists of two equal wheels AA and BB, placed upon the same axis, the former of which is firmly fixed to the axis, while the latter slides upon it, in order to render the space between them greater or less, as is required, to contain blocks of different lengths. This is effected by five bolts, fixed into the rim of one wheel, and passing through the rim of the other. Each bolt has a nut upon it, on the outside of the wheel B. By means of these nuts the wheel B is held fast at any required distance from the other. The head of some of these bolts are marked *x*. Both wheels of the chuck are divided into ten equal parts. At each of these joints, on the wheel A, a short axis, or mandrel, is fitted through a projecting part of the rim of the wheel. On the outside of the wheel, each of these mandrels has a small wheel *a* fixed upon its end. On the ends, in the inside of the wheel, the mandrels have each a short cross bar fixed, just sufficiently long to contain two steel rings; which are exactly the same size and distance apart as those in the mortising machine, which support the block. The wheel B has, at each point opposite the mandrels *a*, a screw centre similar to the back centre of a lathe, but furnished at its point with a steel ring, of the same dimensions as that at the end of the screw of the boring machine. The ring is fitted upon the point of the screw, to turn freely upon the end of it. The blocks are held in between the wheels, by putting the double print at one end of each block against the double rings at the end of one of the mandrels, and then screwing the screw in the other wheel tight up, the block is confined between them. In this manner, the chuck being filled with ten blocks, if they are turned round rapidly, and a chisel or gouge fixed for them to cut against, each will be formed to a segment of the circle in which they move. This gouge is supported in a frame, moving on a fixed rest D, which is curved to a circle, whose centre is in the centre of the chuck. It is confined to move on this arch by a curved radial bar E, fitted to centre on the floor beneath the machine at one end; and having the other attached to the frame FF, which supports the tool. This frame contains a slider *f*, moving in a groove, and at the end carrying the tool *g* in a holder, where it is fixed by a screw. The slider has an axis or spindle, fitted perpendicularly in it at *h*. On the lower end of this is a roller, which applies itself against a curved piece of metal *i*, called a shape. It is fixed fast upon the framing of the machine by a pillar at each end. The roller is kept in contact with the shape by a lever, centered at *k* on the frame F, and connected by a short coupling iron with the slider *f*; so that, when its handle *l* is pressed towards the machine, the roller is kept up to the shape. G is a handle jointed to the frame F; and, by means of this, the frame F, carrying the tool and all its apparatus, can be moved along the rest D, being guided by the radial bar E in its motion. It is evident, that if the other handle *l* is at the same time pushed forward, the roller applies itself to the shape, and, consequently, the gouge describes the same curvature that the shape has. This curvature can readily be altered by the following means: There is a second shape *m* fixed below the former, and, by a simple movement, the roller can be depressed, by slipping its axis downwards in its socket, so as to roll along the lower shape, and give the curvature of it to the tool, instead of the upper one.

The mode of using this machine is as follows: The ten blocks being all fixed in, as before described, and as shewn in the Figure, the frame F of the gouge is turned to one end of the rest D, and the chuck put in rapid motion by a band round a pulley H, fixed on its axis. The workman, with the handle G in his right hand, and *l* in his left, sweeps the frame along its rest by the handle G, while he keeps the roller in contact with the shape, by pressing the lever *l* towards the machine. In this movement the gouge cuts all the ten blocks at once to their proper curvature, at least that face of each which is farthest from the centre. When the frame has slowly traversed the whole length of its sweep, the outside face of all the blocks are finished, and the machine is stopped by casting its movement off from the mill: But, as it preserves a considerable momentum, this is checked by a steel spring at I, which is fixed at one end to the frame, and then extends round a wheel fixed on the pulley H, or rather cast in the same piece. The other end of this spring has a handle upon it; and when this is pressed down, the curved part of the spring incloses the wheel, and operates as a gripe, to check the velocity of the chuck. When the motion ceases, the blocks are all turned one quarter round on the small mandrels *a* by this means. The wheels *a* have each an endles screw, which turns them round. These screws are cut in the ends of as many spindles *d*, pointing towards the centre of the chuck. At the ends of these, nearest the centre, each spindle has a small bevelled wheel *e* fixed upon it. There is also a large bevelled wheel K, which is fitted upon the axis between the wheel A and the pulley H, so as to slip freely round upon the axis, and when it is turned round, it is evident it will turn all the wheels, spindles, screws, and mandrels, at once, and by that means turn all the blocks, so as to bring another face outwards. This is not effected by turning the wheel; but, what has the same effect, the wheel is held fast while the chucks are turned round. To stop the wheel K, a catch L is employed. It moves on a joint fixed on the ground; and when pushed towards the wheel, a stub, or knob, projecting from its rim, is caught in a fork, or notch, at the upper end of the catch. The wheel is now detained, and the attendant to the machine takes hold of the chuck by its rim, and turns it round four times, which he determines by a mark on the wheel A. The bevelled and other wheels are so proportioned, that these four times will make the blocks revolve exactly one quarter on their individual axes, so as to bring another side of each outside. This being done, the catch L is removed, the roller at *h* is shifted by depressing its axis; so that its roller acts against the lower shape, which has a curvature suiting the other side of the blocks. The machine is now put in motion, and the tool moved along its rest, in the same manner as before described; forming, in this manner, the second side of each block. The machine is now stopped, the blocks turned round another quarter, and the upper shape is employed to cut the third side, in the same manner as the first; which being done, the fourth side is cut in the same manner as the second, and with the same shape. The blocks are now completely shaped, and the ten are removed to make way for another set, which are treated in the same manner.

The roller *h*, or rather the socket supporting its axis, is not fixed to the slider *f*, but is fitted to the same in a groove; so that, by means of a screw *n*, it can be moved along the slider. The effect of this is, that the tool *g* projects more or less beyond the shape, as is required, to cut larger or smaller blocks. The mode of adapting the chuck to take in larger blocks has been before mentioned. The same shapes will serve several different sizes; and if not, they can easily be removed, and others substituted of the proper curvature.

Scoring machine.

PLATE LX.

Fig. 1.

The scoring engine receives two blocks, as they come from the shaping engine, and forms the groove round their longest diameters, for the reception of their ropes or straps. A, B, (Fig. 1. Plate LX.) represent these two blocks, each held between two small pillars *a*, (the other pillar is hid behind the block,) fixed in a strong plate D, and pressed against the pillars by a screw *b*, which acts on a clamp *d*. Over the blocks a pair of circular planes or cutters EE are situated, both being fixed on the same spindle, which is turned by a pulley in the middle of it. The spindle is fitted in a frame FF, moving in centres at *ee*, so as to rise and fall, when moved, by a handle *f*. This brings the cutters down upon the blocks; and the depth to which they can cut, is regulated by a curved shape *g*, fixed by screws upon the plate D, between the blocks. Upon this rests a curved piece of metal *h*, fixed to the frame F, and inclosing, but not touching the pulley. To admit the cutters to traverse the whole length of the blocks, the plate *d*, (or rather a frame beneath it,) is sustained between the points of two centres. Screws are seen at *l* on these centres. The frame inclines when the handle L is depressed. At M is a lever, with a weight at the end of it, counterbalancing the weight of the blocks and plate D, all which are above the centre on which they move. The frame F is also provided with a counterpoise to balance the cutters, &c. The cutters E, E are circular wheels of brass, with round edges. Each has two notches in its circumference, at opposite sides; and in these notches chisels are fixed by screws, to project beyond the rim of the wheel, in the manner of a plane iron before its face.

Method of using the scoring engine.

This machine is used as follows: In order to fix the block, it is pressed between the two pins, (only one of which at *a*, can be seen in view), and the clamp *d* screwed up against it, so as just to hold the block, but no more. The clamp has two claws, as is seen in the Figure, each furnished with a ring, entering the double prints before mentioned, in the end of the block. These rings are partly cut away, leaving only such a segment of each as will just retain the block, and the metal between them is taken out to admit the cutter to operate between them, or nearly so. In putting the blocks into this machine, the workman applies the double prints to the ends of the claws of the clamps, but takes care that the blocks are higher up between the pins *a* than they should be; he then takes the handle *f*, and by it presses the cutters EE, (which we suppose are standing still,) down upon the blocks, depressing them between their pins at the same time, till the descent of the cutters is stopped by the piece *h* resting on the shape *g*. He now turns the screws *bb*, to fix the blocks tight. The cutters being put in motion, cut the scores, which will be plainly seen by the mode of adjustment just described, to be of no depth at the pin hole; but by depressing the handle L, so as to incline the blocks, and keeping the cutters down upon their shape *g* by the handle *f*, they will cut any depth towards the ends of the blocks, which the shape *g* admits.

By this means, one quarter of the score is formed; the other is done by turning both blocks together half round, in this manner: The centres *l* are not fitted into the plate D itself, but into a frame seen at R, beneath the plate, which is connected with it by a centre pin, exactly midway between the two blocks A, B. A spring catch, the end of which is seen at *r*, confines them together; when this catch is pressed back, the plate D can be turned about upon its centre pin, so as to change the blocks, end for end, and bring the unscored quarters (*i. e.* over the clamps) beneath the cutters; the workman taking the handles *f* and L, one in each end, and pressing them down, cuts out the second quarter. This might have been effected by simply lifting up the handle L; but in that case the cutter would have struck against the grain of the wood, so as to cut rather roughly; but by this ingenious device, of reversing the blocks, it always cuts clean and smooth, in the direction of the grain. The third and fourth quarters of the score are cut, by turning the other sides of the blocks upwards, and repeating the above operation. The shape *g* can be removed and another put in its place, for different sizes and curves of blocks; but the same pins *a*, and holding clamps *d*, will suit many different sizes.

By these machines the shells of the blocks are completely formed, and they are next polished and finished by hand labour; but as this is performed by tools and methods which are well known, it is needless to enter into any explanation: the finishing required being only a smoothing of the surfaces. The machines cut so perfectly true, as to require no wood to be removed in the finishing; but as they cut without regard to the irregularity of the grain, knots, &c. it happens that many parts are not so smooth as might be wished, and for this purpose manual labour alone can be employed.

The lignum vitæ for the sheaves of the blocks, is cut across the grain of the wood by two cross cutting saws, a circular and straight saw, as before mentioned. These machines do not essentially differ in their principle from the great cross cutting saws we have described, except that the wood revolves while it is cutting, so that a small saw will reach the centre of a large tree, and at the same time cut it truly flat. As the limits prescribed our Plates will not admit of giving drawings of these machines, and as the idea which could be derived from a verbal description would not be materially different from the cross cutting saws before mentioned, we shall defer any farther account of them till a future opportunity. These machines cut off their plates for the end of the tree, which are exactly the thickness for the intended sheave. These pieces are of an irregular figure, and must be rounded and centered in the crown saw.

Cro saw.

Pla LX. Fig.

The *crown saw* is represented in Plate LX. Fig. 2: where A is a pulley revolving by means of an endless strap. It has the crown or trepan saw *a* fixed to it, by a screw cut within the piece, upon which the saw is fixed, and which gives the ring or hoop of the saw sufficient stability to perform its office. Both the pulley and saw revolve together upon a truly cylindrical tube *b*, which is stationary, being attached by a flaunch *c* to a fixed puppet B, and on this tube as an axis, the saw and pulley turn, and may be slid endwise by a collar fitted round the centre piece of the pulley, and having two iron rods (only one of which can be seen at *d* in the figure,) passing through holes made through the flaunch and puppet B. When the saw is drawn back upon its central tube, the end of the latter projects beyond the teeth of the saw. It is by means of this fixed ring or tube within the saw, that the piece of wood *e* is supported during the operation of sawing, being pressed forcibly against it by a screw D, acting through a puppet fixed to the frame of the machine. At the end of this screw, is a cup or bason which applies itself to the piece of wood, so as to form a kind of vice, one side being the end of the fixed tube, the other the cup at the end of the screw D. Within the tube *b*, is a collar for supporting a central axis, which is perfectly cylindrical. The other end of this axis (seen at *f*,) turns in a collar of the fixed puppet E. The central axis has a pulley F, fixed on it, and giving it motion by a strap similar to the other. Close to the latter pulley a collar *g* is fitted on the centre piece of the pulley, so as to slip round freely, but at the same time confined to move endwise with the pulley and its axis. This collar receives the ends of the two iron rods *d*. The opposite ends of these rods are, as above mentioned, connected by a similar collar with the pulley A of the saw *a*. By this connection, both the centre bit, which is screwed into the end of the central axis *f*, and the saw sliding upon the fixed tube *b*, are brought forward to the wood at the same time, both being in rapid motion by their respective pulleys. The power to bring them forward is communicated to the machine by a bent lever H, having a handle *h* at the end, and at the other end a fork, which receives the two ears or pins projecting from a collar *i*, fitted on the central axis, so that the rotatory motion is not interrupted; but the collar cannot slip endwise upon the spindle. At *k* is a spring of sufficient strength to counterbalance the weight of the handle, and draw both the saw and centre bit back. In this state, the workman takes a piece of wood and places it against the end of the fixed tube *b*, so as to be nearly concentric with the saw; then by turning the screw D, he advances the cup at the end of that screw, so as to hold the wood fast; this being done, he depresses the handle *h*, and, as above described, brings the centre bit and the saw both together against the wood. The former bores the central hole, while the latter cuts out the circular periphery of the intended sheave: then raising the handle *h*, the saw and borer retreat, and the round piece of wood may be removed to make way for another rough scantling.

This machine is easily adapted to cut sheaves of different dimensions, by unscrewing the saw from the centre piece of its pulley A, and putting on a larger or smaller one; and the same is the case with the centre bit, which is attached to the central axis, by screwing into the end of it.

The *coaking engine*. This ingenious piece of machinery is represented in Plate LXI. Fig. 1. It is used to cut the three semicircular holes which surround the hole bored by the crown saw, so as to produce a cavity of the shape represented in the sheave S lying on the ground beneath the machine. To effect this, the sheave is fixed (by an universal chuck entering its centre hole) to a circle A, which has three arms extending from it. This circle has a short axis passing through a lever BC, of which C is the fulcrum, formed by a pin projecting from the frame of the machine. D, E, F are three columns rising from the circular frame G. These sustain an upper frame, and two vertical rods *a*. Upon these, a frame slides, carrying a small mandrel *b*, which has the cutter fixed at its lower end. The sliding frame has a screw at *d*, which prevents it descending too deep into the sheave; and a catch at H retains it when raised up above a certain height, so as to hold it out of the way while the sheave is fitting in. The lever BC has a motion on its centre within certain limits, which are determined by two screws, one at *e*, and the other unseen, intercepting the end of a bolt *f*, fitted to the underside of the lever; but by withdrawing this bolt, the lever may be brought forward, so as to remove the sheave to some distance from the centre of the circular frame.

The circle A is confined from turning round on its axis, by the end of one of its arms being engaged with the hook of a detent *h*, which is pressed towards the centre of the wheel by a spring. When this detent is withdrawn by the finger, the circle A may be turned round till the next arm comes to the detent, when it is locked till again set at liberty by the finger. The universal chuck formerly mentioned, for fixing the sheave to the circle A, is an admirable contrivance. The centre piece expands itself concentrically with the axis, in order to fill the centre hole of the sheave in the following manner. A pin is fitted through the centre of the axis of the wheel A, made cylindrical in the part where it fits the axis, but with a fillet to prevent it from turning round. At the lower end it is tapped, and has a nut *r* fitted upon it. The upper end above the axis is formed conical, the smallest part being downwards. Round this is fitted a small ring of steel, the inside conical to fit the pin, and the outside cylindrical, the size of the inside of the centre hole of the sheave. This steel ring is divided into three segments, kept together by a piece of watch spring lapped round them, and contained in a groove turned round the outside of the ring, so that the spring is lodged beneath the surface of the outside of the three segments of the ring. When the nut *r* is screwed down, and the pin pushed up, the spring surrounding the steel ring collapses the segments upon the smallest part of the cone, so that the chuck is of its smallest dimensions. One of the pieces of wood, rounded and centered in the crown saw, is now put with its central hole over the chuck. The nut *r* being screwed, draws the pin down, and the conical head of it expands the steel ring, so as to jamb fast in the central hole, and fix the sheave upon the wheel A. This being done, the lever B is pushed as far as it will go towards the cutter; and the spindle *b*, with its frame, being let down, by disengaging the hook H, its cutter enters the centre hole, (we suppose it all the while revolving by its band,) and the lever B being drawn towards the spectator, it cuts a semicircle of its own diameter on one side of the centre hole, till the lever B is stopped by the point of the screw at *e*. The lever is now pushed back to rest upon its opposite screw, the detent *h* is withdrawn, and the wheel turned round by one of its arms, till a succeeding arm engages the tooth of the detent; then the lever is drawn down towards the spectator, and cuts the second semicircle at 60 degrees distant from the former. This being done, the lever is brought forward, the circle turned round, and the third hole cut. It must be noticed, that when the sheave is turned round with the circle A, the cutter still cuts a part of the wood, and acts to enlarge the central hole to the proper figure, to contain the metal coak or centre. One side of the sheave being cut in this manner, the nut of the screw *r* is slackened, the sheave taken off, and turned the other side upwards, which is to undergo the same process. The semicircles on the different sides of the sheave are cut exactly opposite, by means of a small cylindric pin, with a head large enough to fill one of the semicircles. At the proper distance from the centre, this pin is countermarked in the circle A, and has a small spiral spring surrounding its tail, which throws it always upwards. While the first side of the sheave is cutting, this pin is pressed into the circle, level with its surface; but when the second side is to

Block Machinery, Blockade.

section, the highest point of which forms the cutting edge. The tool is held in the same manner as the gouge of the shaping engine.

Machine for burnishing the pins.

After being turned, the pins are burnished in a curious machine. It has a revolving spindle, placed vertically. The pin is fixed at the end of this, and, as it turns round, is forced down between three dies, or smooth pieces of hard steel, highly polished. These are fitted in a frame, and have screws behind them, by which they can be thrust forwards against the pin, to grasp it tight, and make such a pressure as will burnish down all the spiral scorings left by the turning lathe. The dies are immersed in oil to facilitate the operation, and prevent the dies from heating. The pins after this process are highly polished and fit for use.

Having now explained the mode of making all the parts of a block, its shell, sheave, and pin, it only remains to put them together, in which operation there is nothing singular or worthy of detail.

We shall conclude this article by observing, that these machines, with alterations, might be adapted to many useful purposes in the mechanical arts; particularly the mortising machine, which would be a most excellent tool for forming mortises in any pieces of work where a great number of similar pieces are required, so as to render it worth while to erect such an engine. Any person who has had the patience to stand by a carpenter while performing the tedious and laborious process of mortising through a large beam of wood, will judge of the importance of a machine which makes from 110 to 150 strokes per minute, and cuts at every stroke a chip as thick as pasteboard, with the most perfect accuracy. (J. F.)

We are proud in having had it in our power to present our readers with the first account of these valuable machines that has yet been given to the world; and we are fully compensated by this feeling, for the great labour and expence by which this object has been obtained. We hope, in the course of our work, to lay before our readers, other proofs of the great mechanical genius of Mr Brunell. (Ed.)

BLOCKADE. See Military Tactics.

BLOIS, the Blesæ, or Castrum Blesense of the Romans, a town of France, and capital of the department of the Loire and Cher, agreeably situated in a pleasant country, partly on a small eminence, and partly in a plain near the river Loire. Though the town itself is ill built, yet many of the public edifices are deserving of notice. The castle, which at first sight has the appearance of two separate buildings, that communicate by a passage through the rock, is the chief ornament of the town. A part of it was demolished in 1632 by the duke of Orleans, who built in its place a superb edifice, which is still unfinished. This castle was the birth-place of Louis XII. and the chambers in it are still shewn where the duke of Guise and his brother were assassinated, on the 23d December 1587, by order of Henry III. In the extensive court before the castle is situated the Church of St Saviour, which is a handsome and large building. The cathedral, called the Church of St Solenne, the bridge of seven arches over the Loire, the Jesuits college, and the gates of the city, are the only other objects worthy of attention. The town is supplied with water by a large aqueduct, supposed to be built by the Romans, into which the water descends from the clefts of a rock, about three-quarters of a mile from the city. The water is distributed from a large reservoir near the walls into fountains in different parts of the town. About six miles from Blois is the castle of Chambord, built by Francis I, and belonging to Marshal Saxe, who died there in 1751.

The commerce of Blois consists chiefly of brandy and wines, which are carried by the Loire to Orleans, Paris, Tours, Angers, Laval, and sometimes by land carriage to Normandy.

Blois carries on a considerable trade in serges, ticken, skins, gloves, hats, stockings, knives, &c. About 600 or 700 pieces of serges, &c. made of the wool of the country, are manufactured annually. The gloves of this place have been long held in great estimation. Population 13,312. E. Long. 1° 20′ 10″, N. Lat. 47° 35′ 20″. (π)

BLOOD. See Anatomy and Chemistry, but particularly Physiology.

BLOW-PIPE.

Blow-pipe.

Blow-Pipe, in chemistry, mineralogy, and the arts, is an extremely useful instrument, employed to raise an intense heat by the flame of a lamp or candle. It operates by throwing a rapid current of air through the flame, and by this means urging it violently against the object to be heated, which must necessarily be of small size. The blow-pipe is capable of throwing such a heat on a small object as would be difficult to obtain for a larger quantity of the same substance in the most powerful furnaces, and with this advantage, that the process is all the time under the inspection of the operator, whereas he can only conjecture what passes in the centre of a furnace. The stream of air for blow-pipes is usually raised by a blast from the mouth; in some instances by the vapour of boiling alcohol; and in others from bellows, or other pneumatic machines. We shall begin with blow-pipes of the first kind, as being the most simple and convenient. The common blow-pipe in use among artificers, consists of a conical metal tube, regularly tapering from the size convenient to be held in the mouth to the size of a small pin: The small end is bent with a regular curvature, so as to be nearly at right angles to the main tube. This pipe being held in the mouth, and a regular stream of air discharged through it into the flame of a candle, the flame is projected sidewise into a long conical spiracle of fire, which is of a blue colour at its root, or the part where it joins the flame; farther on it is of a yellow cast, growing more and more faint towards the extreme point. The object to be heated is held so that the flame strikes upon it; or, if it is large, it should be placed upon a piece of charcoal, which reverberates the flame forcibly on all sides of the object, and at the same time maintains the heat by its own combustion. This simple instrument is very effective in the hands of a dextrous operator; but the principal objection to it is, that, after using it a few minutes, the moisture of the air blown from the lungs is condensed, and accumulates in the tube till a drop is formed, which, by means of the current of air, is thrown so forcibly through the flame upon the object to be heated, as to cool it, and spoil the experiment. To remedy this defect, and render the instrument more convenient, many different forms have been proposed.

In consequence of an application to Mr Accum of Compton Street, London, that ingenious chemist has favoured us with a sight of all the blow-pipes which he keeps for sale, and we have gladly availed ourselves of his permission to represent several of them in Plate LXII.

ad's
ipe.

A very common blow-pipe, for chemical and mineralogical experiments, known by the name of Cronstad's Blow-pipe, is represented in Fig 1. It is the same as the common blow-pipe, above mentioned, except in having a globular ball at A. This unscrews in its largest diameter, to remove the moisture which may collect in it. The small pipe *a*, passing away from the ball, enters into it, and projects nearly into the centre, as is shewn by the dotted lines, by which means the globe will hold more water than can ever be collected in it in the course of one experiment, without any danger of getting away at *a*. The mouth-piece B is made of ivory, and the rest of the pipe of brass; the nose *b*, or aperture through which the air issues, may be removed to screw on others of different sized holes. The pipe has generally three of these sizes; the smallest but just large enough to admit a bristle, and the largest only the size of a small pin.

ck's
ipe.

The blow-pipe represented in Fig. 2. is attributed to Dr Black. It is simply a conical tin tube, of a convenient size to be held in the mouth at *a*, and enlarged to an inch diameter at the other end. The jet *b*, fixed to it at one side, is a short pipe soldered into the tube, and projecting inwards almost to its centre on the outer end. It is made conical, and a small jet *b* is stuck upon it. If well fitted, the friction will be quite sufficient to fasten it; and any number of jets may be adapted to fit on. This is a very good kind of blow-pipe, as the large internal surface of the conical tube effectually condenses the vapour of the breath, and affords a lodgment for it in the bottom of the tube. When it collects into a quantity so as to be troublesome, it may be poured out at the end *a*.

ipe
ble

Fig. 5. is a convenient blow-pipe. Its ivory mouth-piece *a*, is fitted to the end of a brass tube A; and at the other end of this is soldered a small cylindrical box B, from the centre of which the jet *b* proceeds. This is fitted in by a joint, which allows the jet to be placed at any angle with the tube, a property which will frequently be found convenient in placing the flame in any direction. The joint is formed by a part of the jet, at right angles to the nose *b*, being fitted through a hole in the box; and the end, which comes through, rivetted down, at least so far as to prevent it coming out The box B has a lid *c*, which unscrews for the purpose of wiping out the dampness.

Wollaston's portable blow-pipe.
PLATE LXII.
Fig. 4.

Fig. 4. is Dr Wollaston's ingenious portable blow-pipe, which is remarkable for its neatness, and the small space into which it may be packed. A is the mouth-piece, *b* a second length of the tube, receiving the conical end of the first, and *d* the jet, with a small globe *e*, which has a hole through it to admit the end of *b*. In the side of this is a hole, which, when the two are put together, coincides with the tube of the jet *d*. This pipe, when joined, has only the properties of the common blow-pipe before mentioned. When its parts are separated, as in the figure, the jet *e* is thrust into the large end of *b*, but the globe is left projecting out of the end; then both these are pushed into the tube A, at its large end, by which means, when put up, it is only the size of A, which is not larger than a small pencil, and may be always carried in the mineralogist's pocket-book; and in many instances will prove extremely useful when a better pipe is not at hand.

New invented blow-pipe.
PLATE LXII.
Fig. 3.

Fig. 3. is a blow-pipe, which has been handed to us by its inventor. It consists of two tubes A, B, of a tolerable size, soldered together like a hammer. The jets are screwed in at *a*, and the end of them projects some distance into the tube B, in order to prevent the water from being blown out. The jet *b*, at the opposite end, is for the escape of a part of the air. When blowing with a small jet, the quantity of air required is so small, that the operator would find relief in opening another, as he would then be enabled to breathe more frequently, and with greater ease.

It will readily be seen, that all the blow-pipes above described have advantages peculiar to themselves, though the differences between them are but trifling; and any of them will perform well, if supplied with a constant and equable stream of air, in which lies the principal art of using the blow-pipe. This is effected by the operator breathing freely through his nostrils, in the most natural manner, without breathing materially quicker or slower than ordinary; but at every expiration, throwing a portion of air into the mouth, so as to inflate the cheeks, which, by their muscular action, condense the air, and force it through the tube into the flame, in a continued stream, though the mouth is only supplied at the interval of every respiration. To perform this readily, requires some practice; and the facility of it can only be obtained by habit, it being one of those things which is not easily taught by words. If a person finds any difficulty in the first attempt, he will derive some advantage, from accustoming himself to breathe through the nostrils, first with the mouth open, and then shut; for in either of these cases, the passage from the lungs through the mouth is closed. Having acquired this habit, he should begin to throw some of the air at each expiration into the mouth, as above described; suffering it to escape regularly through to the pipe, or any other tube held in the lips; but it should have a larger aperture than the jet of the blow-pipe, to render the operation more easy; and he must endeavour to compress the air by the cheeks, with an equable force; for the regularity of the blast materially depends on the regular pressure of the air. Every time, therefore, that the air is injected into the mouth, the cheeks will be swelled out by suffering the muscles to relax in some degree, to enlarge the capacity of the mouth, and will gradually subside as the air issues forth, till a fresh supply inflates them. By this means the mouth will exactly imitate the action of the upper portion of a pair of smiths' bellows, and will regulate the blast on the same principle. The most effective application of the blast to the flame, is the next object of consideration. A lamp is sometimes used, but a candle is probably better. In either case, the flame which it raises must be considerable. The end pipe must be just entered into the flame, and the current of air will throw out a horizontal cone of flame from the opposite side. If it is well managed, the cone will be as distinct and well defined as possible, and extending often to the length of three inches. Care must be taken that the stream of air does not strike against any part of the wick, as it would then be divided, and the cone split into several. It is for this reason that a large flame is required, because the pipe must be somewhat above the wick; and unless the flame is considerable, there will not be sufficient at that part for the stream of air to act upon. In order to increase the flame, it is proper to allow the candle to burn till it has a considerable length of snuff; and this should be opened out into numerous heads, or the wick turned down, so as to expose the largest surface, and cause the greatest flame. The pipe should then be directed through that part of the flame where the combustion appears to be the most perfect and brilliant. By examining the horizontal cone of flame, it appears to be formed of two, the interior cone being blue, and the external yellow, which is therefore the longest, and terminates the flame: the blue being so much deeper in colour, gives the base of the cone the appearance of being blue and capped with yellow. The subject of experiment is held in the yellow flame till it becomes red hot, and is then advanced towards the candle, to bring it into the blue flame, where it receives the greatest heat. It is held in the small platina spoon, Fig. 6, which has the advantage of reflecting the flame from all sides upon the object; and though this does not perhaps actually increase the heat thrown upon the object, it creates an atmosphere of flame and heated air around it, which prevents the object being so much cooled, if it should for an instant be moved out of the cone flame, from the unsteadiness of the hand in holding the pipe or the spoon, or from accidental currents of air which would disturb the flame, and cause such a wavering in the point of the cone, as to divert it, in some measure, from the object.

PLATE LXII. Fig. 6.

The most expert operators with the blow-pipe find, that after they have attained the art of blowing with the most perfect regularity, they sometimes fail in the course of a long experiment, by a tremulous motion which seizes the lips, from the fatigue of holding the pipe so long, with a sufficient force, to prevent the escape of the air by the sides of it. This causes such a motion of the pipe, that the flame is too unsteady to produce a proper effect upon the object. When charcoal is used to support the subject of experiment, it should be of a close compact grain, and properly burnt; for if it is too little carbonised, it will flame like a piece of wood, and obscure the object; and if it is too much burnt, it is so quickly consumed and burned to ashes, that the object is in danger of being lost in it. The charcoal greatly increases the heat; but we are disposed to think that this arises more from the cause to which we have ascribed it in the case of the platina spoon, than from its own combustion, though this has doubtless some effect in heating the object at the opposite side.

The great heat raised from the blow-pipe has been a matter of surprise to many philosophers; for it does not appear to act by increasing the combustion, as is the case in bellows applied to a furnace; it must therefore act by projecting the heat mechanically upon the object, with a greater force and velocity than when it receives it by the mere application of the flame. This opinion is founded upon some experiments made by Count Rumford, which will be found in vol. ii. of his *Essays*. The difficulty of managing the mouth blow-pipe, has induced many operators to employ the glass-blowers lamp. This is a table, with a pair of double bellows fixed beneath it, and worked by the foot. Upon the table, a lamp, or rather a dish of melted tallow, is placed, with a large cotton wick hanging over the side of it. The flame of this is blown by a nose-pipe fixed above the table, and having universal motion. This machine is extremely useful in many of the arts, for softening and bending glass tubes, and for forming any small vessels in glass; and, indeed, it is by this means that all small glasses are blown, as we shall describe under GLASS *Blowing*. This instrument is not at all convenient for the purpose of experiments, as the motion of the body caused by blowing with the foot, prevents the object from being held with the requisite steadiness; though it is extremely useful to the artist for soldering small things in metal, hardening small drills, enamelling, and many other purposes.

In order to have an apparatus at once convenient, steady, and powerful, the alcohol blow-pipes have been invented. Two of these are represented in Plate LXII.

Pict alcohol blow-pi PLATE LXII. Fig. 7.

The first, Fig. 7. is the invention of Professor Pictet of Geneva, and consists of an oval vessel AB, filled with oil, and having two wicks at C and D. The former is for the flame, which is to be blown, and the other is smaller, being intended to heat a small boiler E, which is filled with spirits of wine. On the top of this boiler, a syphon tube F is screwed, which turns down, and presents its jet *e* to the flame of the wick C. The boiler is fitted into a ring, which is supported by a collar sliding up and down on a wire G, and can be fastened by a screw S at any elevation. The nose can be moved sidewise on its wire to meet the flame; and its distance from the flame may be varied, by turning the socket of the wick round. The wick not being in the centre of the socket, of course traverses in a small circle. The jet unscrews at *e*, to change it for a larger or smaller aperture. This blow-pipe operates by the alcohol being boiled by the heat of the lamp D, and its steam or vapour passing over through the syphon tube to the flame at C. Its advantages are, steadiness of the flame, and, at the same time, the inflammable vapour very greatly increases the effect. The only objection to it is, the expense of alcohol and the two lamps.

Fig. 8. is another form of the same instrument, proposed by Mr Benj. Hook. Here the boiler is a globe B, supported in a ring fixed on two pillars *aa*. Between these, a small lamp E slides up and down, and is retained at any height, by the friction of two small springs. This lamp at the same time heats the boiler B, and its flame is urged by the vapour which issues at a pipe F. This passes through the boiler, and rises up above the surface of the spirit, so that there is no danger of its boiling over into the tube. At G is a valve, loaded with a weight acting as a safety valve, to permit the escape of the vapour, if it should become so strong as to endanger the rupture of the vessel; and at H is a screw plug, through which the alcohol is introduced. This instrument acts in the same manner as that before described; and the adjustment of the distance of the wick from the jet is affected in the same manner. The alcohol blow-pipes are not a new invention, one being described by the Abbé Nollet, in his *Art des Experiences*, published in 1770. They have, however, but lately been brought into use, and are found to answer extremely well for small experiments, where the consumption of alcohol is not serious.

From what we have already said, our readers will form some idea of the requisites for a good blow-pipe; and we beg to present them with one, constructed on the same plan as the great blowing engines for the iron furnaces. It is represented in Fig. 9. of Plate LXII. where AB is a vessel of japanned tin, or glass, containing water, and C another included within the former, and closed by a dome at top, and open at the bottom. It is supported in the other vessel by a ring or cover, soldered to both, and perforated with several holes, as shewn in the Figure. On the top of the dome, a short brass tube is soldered, the outside of which is made conical, for the reception of a socket, projecting from the side of a common blow-pipe D. The mouth-piece of this blow-pipe is made globular at *a*, and a short tube *b* is fitted into it, with a valve adapted to the end of it, shutting outwards, so as to prevent the return of any air into the mouth. At the other end of the blow-pipe, a curved tube *d* is fitted on, which has the jet at the end of it. The lamp E is situated on the top of a pedestal, and can be raised or lowered at pleasure, by means of the rivetted nut F. This nut fits upon a screw formed on the stem of the lamp, the lower part of which stem is made square, to prevent it turning round by the action of the nut. The vessel makes a steady support for blow-pipes, which is used by applying the mouth to the tube *b*, and throwing air into the interior vessel C; this expels the water at the lower end of it into the external vessel; and the pressure of the water to return to its original level, causes a constant compression of the air, and forces it through the jet into the flame of the lamp. By this means it is not necessary to blow constantly with the mouth; for if the air is forced into the receiver at intervals, the pressure of the water will expel it in a constant stream, and the operator will not be fatigued by any of the causes above enumerated; or he may take his mouth from the pipe at any time for a few seconds, without interrupting the stream; and he may take the air into his mouth, and blow it into the tube, so as to supply it with pure atmospheric air, instead of that which has passed into the lungs: or if it is more convenient, he may employ an assistant to blow. The socket which connects the blow-pipe with the dome C, is made conical, and fits on very stiff, so as to fix the blow-pipe very firm, at the same time that it admits the pipe to have an angular motion. To adjust its distance from the frame, the joint connecting the jet *d* with the pipe, is fitted in the same manner, to admit of changing the elevation of the jet; and a jet of any other form or size may be fitted on at the same joint. It will easily be seen, that this blow-pipe may be adapted to blow with oxygen gas, by connecting a flexible tube with the mouth-piece *b*. The gas is injected into this pipe from a bladder filled with gas, by means well known to chemists.

The heat raised by oxygen gas, when projected through a blow-pipe upon a piece of burning charcoal, excites the greatest heat that is known. Some very interesting experiments upon this subject were made at the London Philosophical Society in 1798, and are detailed in the *Philosophical Magazine*, vol. viii. The nose pipes, which were used in these experiments, are shewn in Fig. 10. The socket A receives a pipe coming from the gasometer, which contains the gas. Upon this pipe are two brass boxes *d* and *e*, into which are fitted the tubes *f*, *g*, which turn in these boxes, air tight, for the purpose of enabling the operator to move the blow-pipes *h*, *i* nearer or farther from each other. The blow-pipes *h*, *i* also turn at *k*, *l*, in the tubes *f*, *g*, to enable the operator to alter the direction of the streams, and make them fall on the charcoal *m*, at any angle he pleases. This apparatus may be adapted to fit on the end of the blow-pipe, Fig. 9. and may, with very little alteration, be constructed to throw the flame of two lamps into one focus, as has been proposed by a gentleman in America. An inconvenience sometimes occurs in using the inverted receiver: When the blowing stops, and the pressure of the water forces the air from the internal receiver, the momentum of the water rising upon it, is such as to dash up into the pipe, and put out the lamp. To prevent this, a wire is soldered to the bottom of the outside cistern, and extends upward through its whole height. Upon this wire a cork slides, and always floats upon the surface of the water; so that if it rises above its proper level, this cork rises, and forms a plug to close the orifice in the top of the dome, and prevent the water from getting out. For farther information on blow-pipes, see Leblond, in Rozier's *Journal*, tom. xxx. p. 92. Haas, in Nicholson's *Journal*, 8vo. vol. iii. p. 119. Marquard, in the *Repertory of Arts*, vol. xiii. p. 279. Hassenfratz, in Rozier's *Journal*, vol. xxviii. p. 345. Hooke, in Nicholson's *Journal*, 8vo. vol. iv. p. 100. and the same work, 8vo. vol. iii. p. 1. See also Dr Thomas Young's *Natural Philosophy*, vol. ii. p. 534, where the reader will find some curious observations made with the blow-pipe. (J. F.)

Plate LXII. Fig. 10.

BLOWING, an operation by which a continued stream of air is projected with great force and velocity into a furnace, for the purpose of increasing its combustion.

When large bellows are employed for this purpose, or when the air is pumped from a cylinder directly into the furnace, it is introduced in irregular puffs, which are completely insufficient for the intended purpose. In order to equalise and continue the blast, three different contrivances have been adopted. The

Regulating cylinder. first method is by a regulating cylinder, which is fitted with a piston heavily loaded, having at least three pounds on the square inch. The air which is pumped from the blowing cylinder, passes into the regulating cylinder, and as this cannot escape, it will, of course, raise the loaded piston. The twere, or pipe, which conveys the air out of this cylinder into the furnace, is connected with this cylinder, so that when the mouth of the twere is open, the air will rush from the regulating cylinder into the furnace, and the weight of the loaded piston will force the air through the twere with a constant blast during the intervals between each stroke of the piston of the blowing cylinder. This method was originally adopted in blast furnaces; but though the quality of the air is subject to little alteration from any change in the atmosphere, yet the regulating cylinder has several disadvantages. Owing to the small capacity of this cylinder, the blast is not altogether free from irregularities. A considerable quantity of dense air, likewise, escapes by the sides of the piston; and if this is remedied by fitting the piston closer to the cylinder, the friction is so much increased, that the piston does not follow the air fast enough down, and the blast weakens a little at the end of every stroke; while at the beginning of the succeeding stroke, the air must overcome this friction before the piston will rise, and hence another puff accompanies the commencement of each stroke.

Air vault. The second method of equalizing the blast, is by discharging the air from the blowing cylinder into an air-tight apartment, or air vault, the air being prevented from returning into the cylinder by a valve. Let us suppose that the air vault is of such a size as to contain 100 fulls of the blowing cylinder, and that the nose pipe, which discharges the air into the furnace, is stopped. After the engine has made 25 strokes, and forced into the air vault 25 cylinders of air, the air vault will then contain 125 cylinders of air in a state of condensation, and having a force of three pounds upon the square inch. Let the nose pipe be now opened, and let it be of such a size as to discharge one full of the blowing cylinder during one stroke of the engine. The blowing cylinder will then supply the air vault as fast as the air is carried off by the twere, and the blast will be very equal; the end of each blast being only about two parts weaker than the beginning of the blast. It is obvious, that the elasticity of the condensed air will keep up the regularity of the blast during the intervals between each stroke of the engine. The air vault at the Devon iron works is excavated out of the solid rock. It is 72 feet long, 14 feet wide, and 13 feet high, and contains about 13,000 cubic feet of air. Mr Mushet is of opinion, that the air from the air vault is of a very bad quality for the purpose for which it is required. "This immense magazine of compressed air," he observes, "generates a considerable portion of heat, which greedily seizes the damps which are unavoidable in under ground excavations, and conveys them to the furnace. In the summer months, the air becomes so debased, as to affect the quality of the iron, and change it from grey to white. Every change in the temperature of the atmosphere, during this period, is indicated by various changes in the furnace."

Water regul **Plat LXIII.** The third method of equalizing the blast is, by the water vault, or water regulator, which is described in the following article, and represented in Plate LXIII. The water regulator has the advantage of a steady and cold blast. No air is lost, as in the case of the regulating cylinder, and no irregularity arises from friction. The air, however, always contains a considerable portion of moisture from its being in contact with water; and the blast is so cold, that the temperature of the discharged air seldom exceeds 38°, when the temperature of the atmosphere is 60°—65° and 70°.

The effect of the blowing engine depends, in a considerable degree, on the density of the air, and the velocity with which it enters the furnace. Mr Mushet is of opinion, that the area of the discharging pipe, and the compression of the blast, depend on the qualities of the coals employed. "A soft or mixed quality of coal," he observes, "is more susceptible of combustion than either the splint or clod coal; the consequences of which is, that unless the necessary compression of air is used, decomposition is too early accomplished, and the cokes become oxygenated by combustion in a greater ratio than is proper for the carbonation of the metal. To avoid this, the column of air ought to be discharged, in the case of soft coals, under such a degree of compression as to resist entire decomposition in the ignited passage." From this cause, the density of the blast should vary from 2 to 3½ pounds in the square inch. Mr Roebuck supposes, that, "with the given power, it is rather by a great quantity of air thrown into the furnace with a moderate velocity, than by a less quantity thrown in with a greater velocity, that the greatest benefit is derived in the smelting of iron stones in order to produce pig iron." "Chemically speaking," says Dr Robison, "it seems to be the quantity, not the density of the air, which renders it effective in the iron furnace. Yet I can conceive a great quantity of air sent through a furnace without effect, because, being spread through much of the materials, it consumes the fuel too slowly in the different parts of the furnace for raising the smelting heat, whereas the same quantity made more dense, by crowding it into one part of the fuel, will rapidly consume it, and give out all its heat in a very narrow space, and thus produces effects which cannot be produced in any other way." For some of the preceding observations, we have been indebted to a manuscript paper of the late Professor John Robison, which, we believe, was the last production of that distinguished philosopher. It is an answer to several queries of Mr Grieve respecting blowing engines; and we hope to have it in our power to present it to our readers in a future part of our work. For farther information on the subject of this article, see Smeaton's *Reports*; Roebuck, *Phil. Trans. Edin.* vol. v. p. 31.; and Mushet, *Phil Mag.* vol. vi. p. 60, 113, 362. (r)

BLOWING ENGINE, is a machine for forcing air with great velocity into a furnace in order to increase the combustion, and is now used in all the practical operations of metallurgy.

The machine first employed for this purpose was a pair of leather bellows wrought by the hand; but when it became necessary to smelt iron in large quantities, the size and number of the bellows were increased. Two pairs of bellows were so connected by means of a lever, that the one pair shut when the other opened. The handle of each pair was successively moved by two cogs, placed at right angles to each other on the horizontal axis of a water wheel; so that during the revolution of the wheel, one of the cogs shut one pair of bellows, and forced the included air into the furnace, while the other, which was at this instant opened, was shut by means of the other cog, and thus discharged its contents into the furnace. By this means a continued blast is kept up, excepting a trifling pause when the motion is changed. A machine similar to this, called the slag-mill, is used for refining the lava from the reverberating furnace in which lead ore is smelted.

Another engine, called the water blowing machine, has been used for producing a strong blast. It has been pretty generally adopted on the continent for more than a century, but does not seem to have come into use in this country. A current of water is made to pass through a kind of cullendar placed in the open air, and perforated with a number of triangular holes. The water descends through these apertures in many small streams, and by exposing a great surface to the atmosphere, it drags along with it an immense quantity of air, and is conveyed through a tube till it dashes against a stone pedestal inclosed in a large vessel. The mixture of air and water which falls upon the pedestal is dispersed in every direction; the air is separated from the water; it ascends to the upper part of the vessel, and rushes through a pipe to the furnace, while the water descends through apertures at the bottom of the vessel.

Fabri and Dietrich imagined, that the wind is occasioned by the decomposition of the water, or its transformation into gas in consequence of the agitation and percussion of its parts; but M. Venturi, (*Experimental Inquiry concerning the lateral communication of motion in Fluids*, Prop. VIII.) to whom we are indebted for the first philosophical account of this machine, has shewn, that this opinion is erroneous, and that the wind is supplied from the atmosphere; for when the lateral openings were shut, no wind was generated.

Hence the principal object in the construction of these machines is to combine as much air as possible with the descending current. With this view, the water is often made to pass through a cullendar, as already mentioned.

Franciscus Tertius de Lanis, (*Magistero Nat. et Artis*, lib. v. cap. 3.) observes, that he has seen a greater wind generated by a machine of this kind, than could be produced by bellows ten or twelve feet long.*

Machines of such a nature might have been sufficient for smelting iron when charcoal was used for fuel as in other countries; but when coal began to be used, it became necessary to construct machines capable of affording a powerful and constant blast, and formed of the most durable materials.

The earliest contrivance of this kind was a forcing pump, worked by a water wheel, or a steam engine; and it would appear, that the first cylinders of this kind, at least those of any magnitude, were erected by Mr John Smeaton, in 1760, at the Carron iron works. The pumps were wrought alternately by a water wheel, having four cranks upon its axis, each of which moved the piston of a cylinder, which had a stroke of four feet six inches; the diameter of each cylinder being also four feet six inches.

In situations where a fall of water could not be obtained, steam engines were employed to work the pumps; but as these machines were then only single, the piston descending by the pressure of the atmosphere, it was necessary to have some contrivance for producing a continued stream of air during the descent of the piston. This object was effected, by receiving the air into a regulating cylinder of the same size as the blowing cylinder, and furnished with a piston loaded with heavy weights. As every stroke of the engine would pump into this cylinder twice the quantity of air that would pass through the nose pipe into the furnace in the same time, the air raised the loaded piston of the regulating cylinder, and during the time that the engine ceased to act, the weight of the regulating piston forced the air into the furnace. This method of regulating the blast, which continued in general use for many years, has been superseded by the water regulator, and by the double acting blowing cylinder, wrought by a steam engine of Watt and Boulton's construction.

PLATE LXIII. Fig. 1.

An engine of this kind, of large dimensions, is represented in Fig. 1. of Plate LXIII. It is wrought by a steam engine of thirty-five horse power, with a steam cylinder of thirty-three inches diameter, acting with a seven feet stroke. On the opposite end of the beam from the steam cylinder is jointed the rod D, which is turned exceedingly true, so as to move through the stuffing box without allowing any air to escape, and without any unnecessary friction. A quantity of hemp is placed round the rod in the box *a a*, which forms part of the lid of the cylinder, and is held tight by the iron nuts *b b*. The piston is fitted to the lower end of the rod D, and is packed with leather so as to fill exactly the internal diameter of the cylinder A A. To this cylinder are fixed four necks, B, F, G, H; two of which, B, F, contain the suction valves, by which the air enters the cylinder, while the other two contains the forcing valves, through which the air is expelled at every elevation and depression of the piston into the chambers I, K, and through the pipes L, M, into the regulating receiver OP, which is of the form of a parallelopipedon, or an inverted box without the lid, and is immersed in a cistern RS, filled with water.

Let us now suppose that the piston is at the bottom of the cylinder A A, and begins to be raised by the engine. The air above the piston will obviously be condensed, and forcing open the hanging valves in the neck G, will rush through them into the pipe L, and thence into the receiver O P. While the piston thus rises and condenses the air above it, there is a vacuum below the piston, and the external air rushes through the valves in the neck F, and fills the space below the piston. When the piston descends from the top to the bottom of the cylinder, the air below it is condensed, and forced through the valves in the neck H into the pipe L, and thence into the receiver O P, while the space above the piston is a vacuum, and is instantly filled by the rush of the external air through the valves in the neck B. This operation is repeated at every stroke of the engine; the cylinder-full of air, which is inhaled at the necks B and F, being forced through the opposite necks G and H. When the piston reaches the top or bottom of the cylinder, there would evidently be a short cessation in the blast of air that passes into the furnace, were it not for the regulating receiver O P. When the air is forced into this receiver, the water within it is pushed out or displaced, and rises in the cistern, so that the surface of the water in the cistern is often six, seven, or eight feet higher than the surface of the water in the receiver. The air in the receiver, therefore, is pressed upwards by a column of water, six, seven, or eight feet high, so that if there should be any intermission in the supply of air from the cylinder, the blast will be kept up by the extrusion of the air in the receiver. The receiver O P, as shewn in the Figure, is composed of a great number of cast iron plates, united by screws and flaunches. Its size in the drawing is purposely diminished, in order to comprise it within the limits of the Plate. The general size is forty feet in length, twelve feet in depth, and twelve feet in breadth. The water cistern is then forty-seven feet long, fourteen feet deep, and nineteen feet broad. The receiver is supported upon blocks of wood and masonry; its lower edge being two feet from the floor of the cistern, to allow a free passage for the water. The buoyancy of the receiver is overcome by a great quantity of masonry placed upon the top of it; but we have omitted this in the figure, for the purpose of shewing the manner of uniting the plates of which it is composed.

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* Fergusons's *Lectures*, by Dr Brewster, Vol. II. p. 415. See also Lewis's *Commerce of Arts*, the *Journal des Mines*, and Nicholson's *Journal*, Vol. XII. p. 48.

A valve, loaded with a weight, is placed at T in the horizontal pipe. The weight is sufficient to keep the valve shut when the engine works with a proper velocity; but when it works too hard, the excess of air will escape through the valve. When this happens, the velocity of the engine must be diminished.

The horizontal pipe N M, after bending downwards, is divided into two branches X, Y, which, by a series of pipes, convey the air round the furnace, so as to introduce the blast at opposite sides of the hearth; a practice which is now pretty generally followed.

In the construction of a blowing machine the greatest caution is necessary. The pipes should be carried at such a height above the cistern, that there is no possibility of the water, when at its highest point, being forced through the pipes into the furnace.

The cylinder A A is made of cast iron, with a flaunch at each end. The upper necks G, B are cast in the same piece with it, but the lower ones, H, F, are screwed to the under flaunch of the cylinder. The valves within the necks B and F open inwards. They are made of leather, covered with plates of iron, and are screwed, by a projecting part of the leather, against the external plate *a* of the chamber, so as to cover three corresponding apertures in the plate (See Fig. 2.) *x y*, which is screwed to the neck by a number of bolts, shewn in the Figure. This plate is removed when the valves require any material repairs; but any trifling adjustments may be made, by the workman's thrusting his hand through one of the valves to repair the adjacent one. The plates which carry the valves in the chambers I, K, are not moveable; but apertures are left above to give access to the valves. These apertures, when the engine is at work, are covered by the lids *h h*, which are fixed down by screws at each end.

The piston is rendered air tight by means of a ring of leather screwed on the upper and one on the under side of the piston, which, in consequence of their elasticity, press gently against the inside of the cylinder. In order to renew these rings when worn out, there is a hole in the lid, and another in the bottom of the cylinder, sufficient to admit a man for that purpose. In some cases a moveable lid is made in the piston.

The cylinder is held down by four large bolts, two of which are seen in the figure at *d d*, passing through a massive pier of brickwork or masonry, sufficiently stable to keep the cylinder steadily in its place. The cistern R S is placed at a much greater distance from the cylinder than is represented in the Figure, lest the tremulous motion produced by the violent concussion of the included air should make the cistern leak. An accident of this nature ought to be carefully prevented; as the water which escapes may insinuate itself into the sand of the casting-house, and occasion the most perilous explosions, when the hot metal is introduced into the moulds.

The internal diameter of the cylinder A A is five feet two inches, and the stroke seven feet. It is capable of blowing one furnace, when working at the rate of six strokes per minute. (Q)

BLUBBER, the name of the fat which lies under the skin of all large fish of the cetaceous kind. See *Phil. Trans.* N° 77. See also OIL and WHALE. (*j*)

BLUE colour of the sky. See ATMOSPHERE.

BOA, a genus of serpents. See HERPETOLOGY and SERPENT.

BOADICEA, BOUDICIA, or BUNDUICA, a queen of the Iceni, and famous for the formidable resistance which she opposed to the Roman arms in Britain. Prasutagus, the king of the Iceni, had submitted with an unworthy humility to the Roman power, and bequeathed his estates to his two daughters and to the Emperor Nero. In carrying this will into execution, Catus Decianus, the procurator, seized upon all the property of the king. Boadicea remonstrated against this iniquitous proceeding; but her boldness was punished by the most intolerable outrages.

The procurator commanded her to be scourged in public as a slave, and her daughter to be violated by his officers.

Exasperated at these unprovoked aggressions, the Iceni rose in arms. Boadicea inflamed their courage by a species of powerful eloquence which she seems to have possessed; and the spirit of revolt, which was kindled from individual wrongs, was speedily infused into the neighbouring nations. The insurgents soon amounted to above 120,000, and began their offensive operations against the Romans. Camalodunum was taken, and the inhabitants put to the sword. The ninth legion was cut to pieces, and Petilius Cerealius, who commanded the cavalry, was compelled to entrench himself in his camp. In order to quell this rebellion, Suetonius Paulinus marched by a dangerous route to Augusta (London); but as he reckoned this post untenable, he retired to unite his scattered forces. The eastern part of the island was now in the possession of Boadicea. The blood of 70,000 of her persecutors had been shed to expiate her wrongs; and her army now amounted to 230,000. Even against this powerful host, Suetonius determined to risk a battle. He waited in silence the approach of the Britons, who began the attack with loud shouts and songs of victory; but the skill and intrepidity of the Romans repelled this furious attack, and gained a great and decisive battle, with the loss only of 400 killed. More than 80,000 of the Britons fell in this engagement, which put an end to the hopes and the power of the insurgents. Dispirited by this irretrievable defeat, and dreading the consequences of becoming a Roman captive, Boadicea either died with chagrin, or ended her days by poison, (A.D. 61.). See Dion. *Hist. Roman.* lib. lxii. cap. 1—12. Tacit. *Annal.* lib. xiv. cap. 31—37. Hume's *Hist. of England*, chap. i. p. 8. (*)

BOADJOOS, a set of itinerant Mahometan fishermen, of uncertain origin, who live on the coasts of Borneo, Celebes, and other adjacent islands, in small covered boats, which are managed by the women. Their chief occupation is fishing and making salt, which they obtain from sea-weed. The language of the Boadjoos is peculiar to themselves, but they have no written characters. See Stavorinus's *Voyages*, vol. ii. p. 240. (*j*)

BOAR, Wild, the *Sus Scrofa* of sytematic naturalists. The description and habits of this animal will be found under the article Mammalia. In the present article we shall merely give a short account of the method of killing and hunting the boar.

The wild boar abounds in various parts of Europe and Asia, and also in the north of Africa; and in every country that it frequents, it affords a barbarous amusement to the natives.

The best season for hunting boars is between September and December, before they go to rut. The oldest boars are the best subjects for this sport, as they do not run far, and often stop to repel the dogs; while the young boar runs to a great distance, and does not allow the dogs to approach it. As the boar leaves a strong odour behind him, and moves very slowly, trained mastiffs are preferable to fine hunting dogs, which would lose the power of their nose, and acquire a habit of moving slowly. When the dogs are in full chace, the huntsman rides into the middle of them, and impedes and disheartens the boar by charging him with his spear. When the animal finds a place of shelter, he will stand at bay, and attack the dogs as they attempt to seize him. In this situation the huntsmen generally strike the boar with their spear or lance; but this is done with the utmost caution, as he attempts to catch their spear upon his snout or tusk, and often attacks them in the most ferocious manner. The blow is generally aimed between the eyes, or on the shoulder, where it commonly proves fatal. When he attacks the huntsman, he sometimes endeavours to catch the spear in his mouth, and when he succeeds in this attempt, the huntsman will infallibly fall a prey to him, unless another person attacks him behind. The boar returns upon his second opponent, and is sure to fall under this system of alternate attack. The dogs are sometimes provided with bells round their necks, which often prevent the boar from attacking them.

In the year 1787, a boar of an extraordinary size near Cognac in Angoumois, resisted all the attempts of the huntsmen, and killed several dogs and men whenever he was attacked. He was at length slain, and several bullets were found between his skin and flesh. See Buffon's *Hist. Nat.* tom. ix.; and Sonnini's *Travels*, p. 348, &c. (*j*)

BOARDING. See Naval Tactics.

BOAT, Life. The hazard to which mariners are incessantly exposed, and the helpless condition of mankind struggling with an element speedily destructive of existence, have led to many ingenious contrivances for the purpose of averting danger. Though we cannot but lament that the expedients resorted to have so often proved abortive, we must, in justice to the inventors, maintain, that the want of due deliberation, which, in difficult situations, is generally indispensible to success, has more frequently been the occasion of failure than any imperfection in the expedients themselves. About sixty years ago, jackets covered with cork were adopted; yet notwithstanding the certain and immediate security which, in ordinary cases, the use of them will afford, they are now totally neglected. Cords, in like manner, with buoyant substances affixed, are formed to encircle the body; and a buoyant apparatus has, in the course of last year, (1810,) been exhibited in France, by the aid of which a person can safely advance into the sea, without the risk of sinking. The Chinese, when going on voyages, provide themselves with a very simple means of preservation in the event of shipwreck. This consists of four spars joined together, so as to form a square hollow frame, which being put below the arms, easily supports a person floating in the sea. Recently a gun has been employed to throw a rope ashore, for which contrivance a parliamentary reward has been given; and it certainly promises success, where a vessel is stranded, or is driven towards a steep rocky shore. Nay, it is undoubted, that had the same expedient been tried, where there was full opportunity of doing so, the fatal consequences of many most deplorable shipwrecks might have been averted. But an invention which has

Life Boat.

proved of infinitely greater utility, in this island at least, is a vessel of a particular construction, called the *Life Boat.*

It is well known, and has long been familiar to seamen, that some vessels of a certain form are better adapted either to keep the sea, to resist the violence of storms, or the pressure of ice; and it has repeatedly been found, that where others sunk, or were overset, the accident was partly owing to their structure. Examples are commonly given of the Deal boats, and those employed at Madras, of the construction which is best suited to come through the heavy surf beating on an extensive shore; and in different places, the nature of the service to be performed is studied in the structure of the vessel. The wonderful voyages accomplished in open boats, such as those of the Centaur man of war, the Bounty storeship, and the Pandora frigate, proved that safety did not invariably depend on the size of a vessel; and it was thence conceived, that a boat sufficient to extricate shipwrecked mariners from perilous situations, might be navigated by an adventurous crew. But the more immediate origin of the life boat, which we are about to describe, resulted from a dreadful shipwreck in September 1789. A vessel struck on the Herd sands of Tynemouth during a storm; though within 300 yards of the shore, and notwithstanding high rewards were offered, the imminent danger deterred every seaman from going to her relief, and the unfortunate crew dropped one after another from the shrouds into the waves in sight of thousands of spectators. Deeply impressed by this melancholy catastrophe, the gentlemen of South Shields immediately formed themselves into a committee, and offered a premium to any one who should invent a life boat, on such a construction as would be beneficial in situations of danger. Different models were accordingly framed, which were submitted to the committee; and after due consideration, one invented by Mr Henry Greathead of South Shields received the preference. A boat was soon built on the plan of this model, which first made an attempt in January 1790, that proved completely successful; and since that period thousands of useful lives have been preserved, both in this kingdom and abroad, by others of a similar construction.

This is not the only life boat that has been proposed, nor can we affirm that it is not susceptible of essential improvements; yet, having met with more general approbation, and having been more frequently put to practical use, we shall treat of it in preference to others.

The inventor's attention was originally attracted to the principle on which the life boat is constructed, by observing, as he himself expresses it, "that each part of a spheroid divided into quarters, nearly resembles a wooden bowl having projecting ends. If this be thrown into the sea, or broken waters, it cannot be upset, or lie with the bottom upwards." With these remarks in view, Mr Greathead formed his life boat, the keel being a curved beam, and both the stem and stern raking towards each other.

The size of the life boat is arbitrary, depending on the different service it has to perform; and if certain definite dimensions, such as we are about to describe, be adopted, it is from conceiving them sufficient for the intended purpose, and not by a comparison of the advantages attending life boats of various sizes. The life boat is thirty feet in length, ten in breadth, and in depth, from the top of the gunwale to the lower part of the keel in midships, three feet four inches, from the gunwale to the platform within two feet four inches, from the top of the sterns to the bottom of the keel five feet nine inches. Both ends of the boat are alike, the sterns being segments of a circle, with a considerable rake towards each other. The keel consists of a beam three inches thick, of a proportionate breadth in midships, narrowing gradually towards the ends to the breadth of the sterns at the bottom, and bending with a great convexity downward. The bottom section to the floor heads is a curve fore and aft with the sweep of the keel; the floor timber has a small rise, curving from the keel to the floor heads; a bilge plank is wrought in on each side next the floor heads, with a double rabbit or groove of the same thickness as the keel; on the outside of this are fixed two bilge trees, nearly corresponding with the level of the keel. The ends of the bottom section resemble the lower part of a kind of fishing boat which in Scotland is called a coble; from whence to the top of the stern it becomes more elliptical, and forms a considerable projection. The sides, from the floor heads to the top of the gunwale, flaunch off on each side, in proportion to about half the breadth of the floor. The breadth continues far forward towards the ends, leaving a sufficient length of straight side at the top. The sheer is regular along the straight side, and more elevated towards the ends; the gunwale, fixed on the outside, is three inches thick. From the under part of the gunwale, extending 21 feet 6 inches along the whole length of the regular sheer, the sides are cased with layers of cork, sixteen inches downward, and four inches thick; whence the casing projects a little without the gunwale at the top. The boat is fastened with copper nails, and the cork on the outside secured with thin plates or slips of copper. There are five seats, or thwarts, double banked, therefore the boat may be rowed with ten oars, and these thwarts are firmly stanchioned. The oars are short, and made of fir of the best quality, which is preferable to any other wood; for experience has proved, that an ash oar, dressed clean and light, is too flexible among breakers, and if strong and heavy the rower becomes soon exhausted. The oars are slung over an iron thole, provided with a grommet, which enables the rowers, merely by facing about, to row either way without turning the boat; a circumstance of infinite importance in broken water. The boat is steered by an oar at each end, one-third longer than the rowing oars; and, for the convenience of the steersman, a platform within, at the bottom of the boat, is horizontal the length of the midships, and elevated at the ends. From the under part of the thwarts down to the platform, the inside of the boat is cased with cork; on the quantity of which, indeed, the chief properties of the life boat, in our opinion, depend. No less than 7 cwt. of cork being used in the construction of the life boat now described, the great specific levi-

Life Boat.

ty, if we may so express ourselves, will sustain an amazing weight, while the parts of the boat itself hold together. It is not only of great service in keeping the boat in her due position on the sea, but also in creating a tendency immediately to recover from any sudden cant, or lurch, from a heavy wave; and it is, besides, beneficial in diminishing the violence of beating against the sides of the vessel which she may go to relieve. Other important properties have been sought for in the figure and construction of the boat itself; points assuredly meriting the deepest consideration, as they may demonstrate the causes of an unsuccessful attempt, or lead to the formation of life boats on an improved principle. Exclusive of the utility of the cork, it is maintained, that the similarity of the ends of the boat, which admits of her being rowed either way, facilitates her rising over the waves; the curvature of the keel aids her motion in turning, and contributes to the ease of steerage, because a single stroke of the steering oar produces an immediate effect, the boat moving as it were on a centre. When rowing against the waves, the fine entrance below is of use in dividing them; and, combined with the convexity of the bottom, and elliptical form of the stern, enables the boat to rise with wonderful buoyancy in a high sea, as also rapidly to launch forward without shipping water, when a common boat would be in danger of filling. It is said to be proved by experience, that boats of the construction of the life boat, in spreading from the floor heads to the gunwale, are best adapted for rowing against turbulent waves; and that the continuation of the breadth forward, is a great support to her in the sea. When full of water, the life boat is in no danger either of sinking or upsetting, as her internal shallowness, her peculiar figure, and bulk of the cork within, admit but a small quantity of it. These are some of the qualities which are conceived to result from the figure and structure of the life boat, compared with those of the ordinary construction.

The life boat is generally kept in a boat-house close to the beach, where it rests on four low wheels, or trucks, concave, for rolling on oars, or spars laid on the sand, so as to be run out on a moment's notice. But, where the way over which she must be dragged is rough, and the safety of her frame would be endangered, another expedient is adopted. This consists of two wheels, twelve feet in diameter, with a moveable arched axis, to which a pole is fixed for a lever. The boat is suspended between the wheels, under the axis, towards each extremity of which is an iron pin. When the pole is perpendicularly elevated, the upper part of the axis becomes depressed, and a pair of rope slings encompassing the boat being fixed to the iron pins, she is raised with great facility by means of the pole, which is then fastened down to her stern. There are commonly two crews, each consisting of twelve men, employed to navigate the life boat, to whom rewards are distributed, according to the success of their enterprise.

On the first alarm of a vessel in danger, the life boat immediately puts to sea, when some experienced steady person takes the command. Her head should be kept to the sea, and she must possess an accelerated velocity to meet the wave. Great caution is to be observed on approaching a wreck, where the reflux of the waves is often productive of danger, and it is considered safest to go to the lee quarter. This, however, depends on circumstances.

A life boat, built on the preceding construction by Mr Henry Greathead, the inventor, first went off from South Shields in January 1790, and completely succeeded in bringing the crew of a stranded vessel ashore. After the value of the invention had been acknowledged, by the presentation of a gold medallion to Mr Greathead by the Society for the Encouragement of Arts, as also one by the Royal Humane Society, and various gratuities in money, parliament, on the 9th of June 1802, unanimously voted him £1200. The committee of underwriters likewise at Lloyd's Coffeehouse in London, having voted Mr Greathead 100 guineas, appropriated £2000 of their funds for the purpose of encouraging the building of life boats on different parts of the coasts of the kingdom. Life boats have been sent from Britain, on the order of the Emperor of Russia, who signified his approbation by presenting the inventor with a diamond ring; by the Kings of Prussia, Denmark, and those of other states.

Although the life boat has been successful in innumerable cases, and has been the means of preserving many valuable lives, it has sometimes failed. Of this there was a deplorable instance in last year, 1810. The weather becoming more moderate on the 7th of April than it had been for some time past, induced several fishermen near Tynemouth to launch their boats and put out to sea. But a furious storm suddenly arising, great apprehensions were entertained for their safety, and the life boat was quickly procured, which, amidst a high sea, rowed through the breakers with fifteen men. The fishermen were safely taken on board, and 2000 people were collected on shore, anxiously expecting the return of the adventurers. Some difference of opinion prevailed among the crew of the life boat, regarding the most suitable place at which to land, and the majority determined to push for Hartley Bates, instead of making Shields' harbour, which they could have done within an hour. When nearly in a state of perfect security, a very high wave broke into the life boat, killed or dreadfully maimed the steersman, along with two or three others, and almost stove her in pieces. Nevertheless she continued floating, though her gunwales were level with the broken water; but the crew lost all command of her, and, drifting still nearer the shore, she struck and split asunder. Only two individuals out of twenty-seven, from this unfortunate circumstance, escaped. It is true, that there might here have been mismanagement, but there are situations where the attempts of the life boat may be abortive. It proves of infinite utility on a sandy beach, but can be less serviceable on a rocky shore. The great weight of this life boat is also a considerable impediment, both to dispatch in getting her out, and to management in a turbulent sea.

Previous to Mr Greathead's invention, a patent was granted to Mr Lionel Lukin, a coachmaker in London, for "an improvement in the construction of boats and small vessels, which will neither sink nor overset." The essence of the invention rests on the property and practice of outriggers, known to all the savages of the South Sea islands. Projecting gunwales are built to vessels of the ordinary construction, sloping from the top of the common gunwale towards the water, so as not to interrupt the oars in rowing; and from the extreme projection returning to the side in a faint curve, at a suitable distance above the water line. These projecting gunwales are very small at the stem and stern, and gradually increase to the requisite dimensions: and they may either be solid consisting of light substances, of cork, or hollow. In the inside of the vessel at stem and stern, and at the sides where projecting gunwales are unnecessary, as also under the seats and thwarts, are to be inclosures or bulk heads water tight, or filled with substances specifically lighter than water. "By this means," the inventor observes, "the boat or vessel will be so much lighter than the body of the water it must displace in sinking, that it will with safety carry more than its common burden, though the remaining space should by any accident be filled with water." To give stability to the vessel, the inventor further proposes to affix a false keel of cast iron or other metal along the centre of the real one. The patent granted to Mr Lukin is dated in 1785. We do not discover that he obtained any honorary reward for his invention, but above twenty years later we find a gold medal voted by the Society for the Encouragement of Arts to Mr Christopher Wilson, for a "secure sailing boat, or life boat." This boat, which is called the *neutral built self-balanced boat*, is balanced exactly according to Mr Lukin's device, by empty projecting gunwales. Mr Wilson divides his projecting gunwales into compartments, by which means the failure of one will not injure the others, and is undoubtedly a material improvement. The Chinese vessels are said to be on the same principle. Instead of a large open hold, as in European ships, there are so many chambers, all water tight, and unconnected with each other, so that a leak springing in one cannot communicate to the rest. There are some peculiarities in the construction of Mr Wilson's boat, in being neither clincher nor carvel built, which enables her to sail quicker; and the oars, resting on the extremity of the projecting gunwale, rowing is also more easily accomplished. These gunwales are a foot in breadth; and Mr Wilson affirms, that his boat cannot roll at sea, but must always keep a level position, so far as the surface of the sea will allow. "She may heel, but cannot roll; as the balances (projections) are always ready to catch either way, and the opposite one assists the other by its weight out of water and gravitation; neither can this boat pitch like another, for the balance bodies (empty gunwales) being out of the water, and the breadth of six feet only in the water, it can act with a gravity on the water equal to a boat of the weight (width) of six feet; but the resistance of the water upwards equal a boat of eight feet wide." The author of this device is here exactly describing the property of outriggers, to which his reasoning is applicable in respect to the projections. But, excepting in the compartments of the hollow gunwales, we can scarcely discern any difference between his boat and Mr Lukin's. An experiment is said to have been made with it in 1806, when eight persons put to sea and rowed through very heavy breakers, during boisterous weather. She shipped very little water, and seemed to promise much utility. But we cannot overlook, on a comparison with Mr Greathead's boat, that the latter, even though shattered, preserves a great degree of buoyancy from the quantity of cork used in its construction; whereas Mr Lukin's or Mr Wilson's boat in that condition would only have the buoyancy of simple timber. A boat of superior staunchness and strength, devised by Mr Boswell, cannot properly be included under this head, although the principles which he lays down merit consideration, because there is nothing to prevent them from being adopted in a life boat.

Several years previous to 1798, Mr Bremner, a Scottish clergyman in the Orkneys, conceived it practicable to prepare a common ship boat in such a manner, as to be highly useful in cases of shipwreck. The expedient he proposes is, first, to load the bottom or keel with a piece of iron for ballast of three hundred weight. Secondly, to secure a quantity of cork, by lashings, sufficient to render any particular boat buoyant; or, where cork cannot be procured, to secure, in like manner by lashings, two casks in the inside of the bow of the boat, and other two in the stern, which shall have the same effect. In preparing a boat for this apparatus, four ring bolts must be fastened in the inside of the keel, one close to the stem, and another close to the stern, and each of the remaining two a third of the whole length from stem and stern. On the outside of the keel are to be two auger holes, through which ropes lashing the cork may be run and fastened to the ring bolts. "The quantity of cork necessary, which will depend on the size of the boat, is to be made up into several parcels, but none larger than one person can easily manage. Each parcel to be properly secured and numbered, so that the whole may fit and fill up the boat completely in the spaces betwixt the ring bolts fore and aft, as above described; and to answer the end, it is material that there should be cork enough to rise nearly three feet above the gunwales, so as to form an arch from gunwale to gunwale. The cork being thus laid in the boat, it is to be properly secured, first, by passing a strong rope round all, over the gunwales and through the auger bore outside the keel: as also by passing seizing ropes from the ring bolt in the stem to that next it in the keel, taking care to make as many turns and seizings betwixt these ring bolts as completely to secure the cork from slipping out. The very same thing to be done as to the rope round the gunwales and through the hole outside the keel, with seizing ropes from the ring bolts, to be made aft, or in the stern of the boat." We readily agree with Mr Bremner, that, in ordinary circumstances, a boat provided thus with buoyant substances, will neither sink nor overset; but the previous condition of three hundred weight of iron for ballast, we acknowledge inspires us with well-grounded apprehension. Neither is there any thing here to enable the boat to encounter a boisterous sea, which in all life boats we consider an indispensible qualification. The buoyancy of a cargo has preserved many vessels. In the deplorable accident which befel the Guardian frigate, she sunk until her decks were level with the water; and when all her remaining crew expected to be instantly swallowed up in the ocean, to their inexpressible astonishment she still floated. But the decks of the vessel were strong, and there were empty casks within, which, exactly on Mr Bremner's principle, prevented her from sinking. We doubt not that in smooth water, and in certain cases of shipwreck, a boat provided with cork or casks may be useful; yet we cannot forget that, without either, some open boats have sailed one, two, even above three thousand miles through tempestuous seas. The Royal Humane Society awarded a premium for this expedient in 1800; and the Highland Society of Scotland, to which the model of a boat prepared as above was transmitted, likewise testified their approbation by an honorary remuneration. We believe that more recently, Mr Bremner has submitted his expedient to the Society for the Encouragement of Arts, and that it has met with the like approval, though we are still ignorant of the particulars. The principal inferiority of this and the other life boats, compared with Mr Greathead's invention, consists in their being so much more easily injured, and in their remaining serviceable only so long as entire; whereas his boat may be grievously damaged, and still bring a crew safe ashore. In studying the best principles whereon a life boat should be constructed, great regard is to be paid to those expedients adopted by shipwrecked mariners, who had few conveniences at command; and to the causes which have been destructive of open boats or decked vessels at sea. See Greathead's *Report of the Evidence respecting the Invention of the Life Boat. Transactions for the Encouragement of Arts*, vol. x. 20, 25. *Repertory of Arts*, vol. iii. 27. *Transactions of the Highland Society*, vol. ii. (*c*)

Boccacio.

BOCCACIO, or **Boccace, John**, sometimes called **John de Certáldo**, a celebrated Italian writer, was born at Certaldo, in Tuscany, in the year 1313.[*] Though his father was a peasant with a large family, he resolved to educate him for the mercantile profession; and, with this view, placed him under a merchant at Florence, who carried him with him to Paris. From his knowledge of accounts he at first gained the affection of his master; but his taste for poetry began to relax his attention to business, and, after a service of six years, his master dismissed him for negligence. He now began the study of the canon law; but neither the remonstrances of his friends, nor the hopes of preferment, could induce him to continue a study which was at such variance with his taste for poetry and philosophy. He persevered, however, in his studies till the death of his father, when he abandoned all his professional views, and devoted himself wholly to poetry. He put himself under the instruction of Petrarch, and sought for knowledge from every other master he could procure; but his small patrimony was insufficient for such expenses, and he was compelled to accept the generosity of Petrarch, who supplied him both with money and books. About this time he met with Leontius Pilatus, a learned Greek of Thessalonica, whom he received into his house, and loaded with kindness, and by whom he was initiated into Greek literature. He heard him read Homer; he conversed with him familiarly for almost three years; and, as Boccacio himself remarks, "his best memory was unable to retain the infinite number of things he told me, my mind being also perplexed with other cares, had I not committed them to writing." The reputation which Boccacio soon acquired, in consequence of his intellectual attainments, attracted the attention of the republic of Florence, who honoured him with the freedom of the city, and employed him in many of their public concerns. In consequence of the turbulent state of Florence, which was then agitated with contending factions, Petrarch (1350) withdrew from that city into security and retirement. The republic regretted the loss of this illustrious poet, and commissioned (1351) Boccacio to negociate his return; but, instead of succeeding in this attempt, Boccacio was inspired by Petrarch with the same love of tranquillity, and he henceforth resolved to quit Florence. After having visited several parts of Italy, he went to the court of Naples, where he met with a kind reception from King Robert. Here he fell in love with Mary of Arragon, the natural daughter of that prince, whom he has celebrated under the name of Fiametta, and from this cause he remained a considerable time at Naples. From Naples he went to Sicily, where he attracted the particular notice of Queen Joan. The tranquillity of Florence being in some measure restored, Boccacio returned to that city. In 1359, he went to visit Petrarch at Milan, and, in consequence of some conversation which passed between them, he resolved to follow a more serious course of life. This resolution was carried into effect in 1361, when he was warned that his life would be short. This warning was given him by Joachim Ciani, a Curthusian friar of Sienna, who came to him at Florence, and requested a private audience. "I came hither," said the friar, "at the desire of the blessed Father Petroni, a Carthusian of Sienna, who, though he never saw you, by the illumination of heaven knows you thoroughly. He charged me to represent to you your extreme danger, unless you reform your manners and your writings, which are the instruments the devil uses to draw men into his snares, to tempt them to sinful lusts, and to promote the depravity of their conduct. Ought you not to blush for such an abuse of the talents God has given you for his glory? What a reward might you have obtained, had you made a good use of that wit and eloquence with which he has endowed you! On the contrary, what ought you not to fear from devoting yourself to lust, and waging war with modesty, by giving lessons of libertinism both in your life and writings! The blessed Petroni, celebrated for his miracles and the sobriety of his life, speaks to you by my voice. He charged me in his last moments, to beseech and exhort you, in the most sacred manner, to renounce poetry and those profane studies that have been your constant employment, and prevented

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[*] Mrs Dobson says, that Boccacio was born at Paris. *Life of Petrarch*, book iv, 8vo, vol. ii. p. 31.

Boccacio.

you from discharging your duty as a Christian. If you do not follow my directions, be assured you have but a short time to live, and that you shall suffer eternal punishments after your death. God has revealed this to Father Petroni, who gave me strict charge to inform you of it." Terrified at this solemn admonition, Boccacio asked the friar how Petroni came to know him; to which Ciani replied, that Petroni saw all this in a vision, and charged him with this and other commissions at Naples, France, and England.

In consequence of this interview, Boccacio abandoned the study of poetry and the profane authors, and, in opposition to the expostulations of Petrarch, he determined even to dispose of his library. Under these serious impressions, he assumed the clerical habit, and became more regular and circumspect in his conduct. He revisited Naples in 1362 or 1363, and he soon afterwards went to Venice to see Petrarch. In 1365, he was chosen ambassador to Pope Urban V. at Avignon, and in 1367 he attended that pontiff at Rome in the same capacity. He was appointed to the public lecture on the Comedia of Dante, which was then instituted at Florence, and began his labours in October 1373. The bustle of active life, however, was too oppressive for his advanced age, so that he felt it necessary to retire to Certaldo, where he died of a disease in his stomach, on the 21st of December 1375, in the 62d year of his age, and was buried in the church of St James and St Philip.

Boccacio was the author of numerous works, both in poetry and prose. Though he was ranked in the poetical triumvirate next to Dante and Petrarch, his poetical compositions are feeble and languid. His *Theseide* is remarkable chiefly for the new kind of measure in which it is written. Boccacio seems to have been sensible of his inferiority as a poet. After having perused the sonnets and songs of Petrarch, he resolved to commit his own to the flames; and in spite of the remonstrance of Petrarch, he actually burnt all his Italian verses.

The elegance and purity of the stile, however, in which his prose compositions are written, amply atone for the defects of his poetry. The most celebrated of his productions is his *Decamerone*, or a collection of an hundred stories, supposed to have been recited in ten days, by a party of ladies and gentlemen, who had retired from the plague at Florence in 1348. This work met with universal applause. It passed through numerous editions. It was translated into many foreign languages; and even Petrarch himself was so delighted with it, as to translate it into Latin, and dedicate the work to Boccacio. The stories of the *Decamerone* are only partly fictitious. The manners of various classes of society are accurately pourtrayed; the tricks of the priests are severely exposed; and the absurd doctrines of the Catholic faith are lashed with the same severity. Hence the Roman Catholic writers have charged Boccacio with impiety and immorality, and his *Decamerone* has been put into the list of prohibited books. Nor is this charge altogether without foundation. The stories are often of such a lascivious and obscene nature, that the French translator, in the edition of 1697, "has taken particular care to regulate the expressions, and to wrap up things in such a manner that the fair sex may laugh at them without blushing." Bayle calls it "a work of gallantry, wherein are to be seen very diverting love adventures, and a great many roguish tricks played husbands."

The other works of Boccacio are, 1. his treatise *De Genealogia Deorum*, fol. Basil, 1532, with the notes of J. Mycillus; and containing also a *Treatise on Mountains, Rivers, Seas, and Lakes.* 2. *An Abridgment of the Roman History from Romulus* to A. U. 724. Cologn. 1534, 8vo. 3. *De Casibus Virorum illustrium*, beginning with Adam and ending with John King of France. Augs. 1544. This work was translated into Italian, Spanish, English, and French. His Italian works are, his *Il Philocalo; La Fiameitta; L'Ameto; Il Labirinto d'Amore; La Vita di Dante;* which are all written in prose, and, excepting the last, are all romances of an amorous kind, interspersed with poetry. See Fabricii, *Biblioth. Latin Med. ævi*, tom. i. p. 248. Tiraboschi, *Storia della Letteratura Italiana*, tom. v. p. 83, 439. &c. Dobson's *Life of Petrarch, passim.* Roscoe's *Life and Pontificate of Leo. X.* chap. xv. vol. iii. p. 198. Roscoe's *Life of Lorenzo de Medici*, chap. v. vol. i. p. 320. Gibbon's *Hist.* chap. lxvi. vol. xii. p. 103. (π)

BOCCOLD. See ANABAPTISTS.

BOCCONIA, a genus of plants of the class Dodecandria, and order Monogynia. See BOTANY. (w)

BOCHART, SAMUEL, the most learned writer of his age, was born of a good family at Rouen, in 1599. His father, who was minister of the reformed church at Rouen, paid particular attention to the education of his son, and had the happiness of witnessing his surprising progress in the acquisition of knowledge. He was put under the care of Thomas Dempster, a learned Scotsman, who published a book on Roman antiquities in 1612; and such was the maturity of his genius, that, at the age of twelve, he composed forty-four Greek verses in praise of his master, which were published at the beginning of the book just mentioned. Having gone through a course of philosophy at Sedan, and maintained public theses in 1615, he went to study divinity at Saumur, under Camero; but owing to the civil war, which dispersed that academy, he went with Camero to London, where he appears to have remained only a short time. In 1621, he repaired to Leyden, where he studied Arabic under Erpenius, and formed a particular connection with his maternal uncle M. Rivet, who dedicated to Bochart his *Catholicus Orthodoxus* in 1629. On his return to France, he was appointed to the church of Caen, in Normandy, where his reputation was greatly extended by a long theological controversy which he held with Veron. This theologian having a special mission from the court to dispute throughout the kingdom, challenged Bochart on the 4th of September, 1628, and harassed him in the most importunate manner till the time and place were appointed. This dispute was held in the castle of Caen, before a number of Protestants and Catholics, and in presence of the Duke de Longueville, governor of the province, and continued for nine sittings, from the 22d of September till the 3d of October, when Veron was compelled to quit the field.

This travelling controversialist, however, claimed the victory; though his ignorance of Greek and Hebrew, and his sophistry and vanity, were completely exposed by his learned antagonist. The high reputation which Bochart derived from this controversy, was greatly increased, in 1649, by the publication of his *Phaleg* and *Canaan*, the titles of the two parts of his *Geographia Sacra*, a work which treats of the dispersion of mankind occasioned by the confusion of tongues, and of the colonies and language of the Phenicians. In the course of his extensive researches, his attention was necessarily directed to many collateral subjects; and had his life been prolonged, oriental literature would have received many important additions from his pen. His attention was attracted to these subjects, while preparing sermons on the book of Genesis. When he came to the second chapter, he was led to explain the situation of the garden of Eden. The following chapter turned his attention to the origin of nations; and many passages occurred, which directed his attention to the animals, plants, and precious stones mentioned in the Bible. On a branch of this last subject, he published a work at London, in 1663, entitled, *Hierozoicon*, or *De Animalibus Sacræ Scripturæ*. The information which he collected respecting the garden of Eden, the plants, and precious stones, &c. were not in a state fit for publication at the time of his death.

In the year 1652, Bochart was invited to the court of Christina, Queen of Sweden; and, in compliance with the earnest wishes of that illustrious princess, he repaired thither in company with M. Huet, afterwards Bishop of Avranches, who composed an elegant poem on their journey, in Latin verse. The caprice and levity of the Swedish Queen, however, did not well accord with the sober gravity of a divine. Bochart did not relish the liberties which she was disposed to take with her literary friends; and he returned to France in 1653. When engaged in a dispute with Huet, at a meeting of the Academy of Caen, he was cut off by an apoplectic stroke, on the 16th May 1667.

"The learning of Bochart," says Mr Bayle, "vast as it was, was not his principal qualification; he had a modesty infinitely more estimable in him than all his knowledge. And, on that account, he possessed his glory with a great deal of tranquillity, sheltered from those unhappy quarrels, which so many other learned men draw on themselves, by their pride and passionate style."

Besides the works already mentioned, Bochart published a letter, in 1650, *On the authority of Kings, and the institution of Bishops and Priests*; in 1663, a letter to M. Sarran, attempting to prove that Æneas was never in Italy; and a treatise against La Barré, the Jesuit, *On the Toleration of Lutheranism*. The two first of these were published in the edition of his *Geographia Sacra*, printed at Frankfort in 1681. The works of Bochart were collected and published at Leyden in 1712, in three volumes folio, by M. de Villemandy. (*o*)

BOCNIA, a town in the palatinate of Cracow, in Poland, surrounded with hills, and situated near the small river Raab, which runs into the Vistula. It is celebrated for its salt mines, which were discovered in 1251. The mine is about 10,000 feet long, 750 broad, and 1200 deep. Alabaster, and large pieces of black wood encrusted with salt, are found in it. The salt occurs in veins; and, after being cut into small pieces, is packed up in casks. (*j*)

BODEGA, the name of a harbour on the west coast of North America. The north point, which consists of low steep cliffs, has the appearance of an island when seen from the south. The land retires to the east, and forms an inlet favourable for anchorage. It is much exposed to the south and south-east winds; and the entrance of the harbour is obstructed by a bank of sand, on which the water is about nine feet deep. The land rises gently from the shore, and is covered with bushes and verdure. The natives were quite inoffensive. The men went naked, while the women wore skins over their shoulders, and about their waists, and were tatooed like the females of the Sandwich Islands. The language which they spoke, was a mixture of Spanish and their own dialect. East Long. 237° 21′, North Lat. 38° 21′. See Vancouver's *Voyage*. (π)

BODIANUS, a genus of thoracic fishes. See ICHTHYOLOGY. (*w*)

BODMIN, a borough and market town in Cornwall, situated between two hills, nearly in the centre of the county. The town, which has lately been much improved, stands on the northern face of one of the hills, and consists of a single street, unequally paved, and narrow at one end, stretching for a mile from east to west. It was once the principal seat of religion in the district, and is said to have contained no fewer than fourteen churches. The parish church, the only one now remaining, is a large ancient building, consisting of three aisles and a tower. The principal public building is a new county jail and bridewell, begun in 1779, on the plan of Howard. Near the town are some monumental stones, arranged in three circles, called the Hurlers, supposed, by Dr Stukely, to be the remains of a Druid temple. There is here a manufacture of common serges, and a number of dealers in wool, which is washed and combed in the town, and spun in the surrounding parishes. The yarn is sent to Ashburton, and other places in Devonshire. Large quantities of wool are also deposited here for sale. Number of houses 325. Population 2299, of whom 350 are returned as engaged in trade and manufactures. See Polywhele's *History of Cornwall*. (*o*)

BOECE, or BOETHIUS, HECTOR, a native of Dundee, descended from an ancient family in the shire of Angus, was born in the year 1470. He first studied at Dundee, and then at Aberdeen, where he was afterwards professor. On quitting Aberdeen he visited Paris, and became a student in that university in the college of Montague. This was the commencement of a friendship and correspondence betwixt him and Erasmus, the scholar and the wit, whose letters, addressed to Boethius, are still extant, and sufficiently attest the estimation in which he held his correspondent. Boethius was appointed principal of King's college, which was founded in Aberdeen by Dr William Elphinston, bishop of Aberdeen, about the year 1500. All testimonies agree in the description of his social qualities, and literary attainments.

Boece.

Of the latter, indeed, his productions are a sufficiently honourable testimony. They consist of his *Lives of the Bishops of Aberdeen*, three parts of which are given to Elphinston, the founder of his college. This work does not appear to have been publicly commented upon, with much either of praise or of animadversion. But his great production, the history of Scotland, *Scotorum Historia ab illius Gentis origine*, 1526, has been the subject of dispute, strongly seasoned with that bitterness, which is thought to relieve the insipidity of learned disputation. Lloyd, bishop of Worcester, described Boethius as a late romancer. Sir Robert Gordon of Stratogh, with greater decorum of language, condemned him as severely. "To confess the truth," he says, "I dislike Boethius's history. Ignorant of the laws of historical writing, and living in a rude age, he has written what we cannot read without shame." He then notices his stories of Caractacus, the Silures, whom he places in the north, Camelodunum, and the threatening letter of their king to Julius Cæsar; and then asks, "Is not this solemn doating?" Stillingfleet, bishop of Worcester, pronounces, that if Hector Boethius did not forge all the names of the pretended first race of Scottish kings, from Fergus I. to Fergus II., he did insert many things contrary to the ancient mythology in John de Fordon, and filled up the story of those kings, not out of their own annals as far as yet appears, but in a great measure out of his own invention. Boethius, however, has not wanted advocates; of whom the most distinguished were, Sir George Mackenzie, in an answer to Bishop Lloyd, entitled, *A Defence of the Royal Line of Scotland*, and Archbishop Spotiswood. The archbishop does not scruple to say, that "Boethius is traduced by some of the English writers for a fabulous and partial historian; but they who like to peruse his history will perceive, that this is spoken out of passion and malice, and not upon any just cause." The truth, however, as in most cases of opposing prejudices, probably lies between both. The mind of Boethius was certainly strongly tinctured with the credulity of his day; and he has admitted into his history narratives of idle miracles, pretended to have lent their art to signalize every public revolution. He has also brought its authenticity into some suspicion, by the frequent and detailed specimens of oratory which he has thrown into his history. Hence when his friend and panegyrist Erasmus declares, that "he knew not to lie;" if the phrase allowed it, it would be difficult not to suspect the lively reformer of a sly equivoque, admitting only his want of dexterity. Vossius may seem an impartial judge; and he confessed, in his time, that Boethius had mingled many fables with authentic history: and Buchanan owned, that he was not to be excused.

The history is written in a style which has gained it the highest commendations. Erasmus describes the author as a man of extraordinary felicity of talents, and natural eloquence. As a proof that he gave this opinion honestly, (for he sometimes flattered princes,) he gave a catalogue of his own works then published, 1530, in a letter to Boethius; and in another he sent him some poetical trifles, which he did not wish to see the light, with this confidential caution, *Si quid Erasmum amas, cave illius nugas usquam efferas.*

Boethius is thought to have died about the year 1550. Before his death, he added an eighteenth and part of a nineteenth book to his history, which was afterwards brought down to the reign of James III. by Ferrerius, a Piedmontese. Ferrerius, speaking of the eighteenth book, declares, that he has treated of things there in so comprehensive a manner, that he believes no one could have executed the design with more fidelity and life than he has done.

An epigram was written upon Boethius by Humphrey Lloyd, the English antiquarian, which for dulness might be given for his epitaph:

Hectoris historici tot quot mendacia quæris
Si vis ut numerem, lector amice, tibi,
Idem me jubeas fluctus numerare marinos,
Et liquidi stellas dinumerare poli.

This is no more to be accused of wit than that which was written upon his friend and correspondent Erasmus, though its prosody is better. See **Erasmus.** (J. M.)

BOEHMERIA, a genus of plants of the class Monœcia, and order Tetrandria. See **Botany.** (w)

BŒOTIA, was an ancient kingdom of Greece; bounded on the east by Mount Citheron, which separated it from Attica; on the south by the gulf of Corinth; on the west by Phocis; and on the north by the strait Euripus, now called the Negropont. This region is now denominated *Stramulippa*; and Thebes, its ancient capital, is known by the modern appellation *Stives*. Adorned by the Copais, a lake fourteen miles in length and eight in breadth, and intersected by the rivers Ismenes and Asopus, as well as by many lesser streams, the valleys of Bœotia were remarkably fertile; and the hills, which were most numerous in the district of Aonia, properly so called, afforded excellent pasturage for flocks. Washed by the sea on three sides, and indented with many convenient harbours, no country was more adapted for the cultivation of an extensive commerce, and for adding to its natural productions the comforts and luxuries of the various quarters of the globe. The following places, rendered famous either by the poetic or historic muse, were situated in this region. Aulis, a sea-port on the Euripus, celebrated as the place where the Grecian heroes assembled to form that confederacy which terminated in the destruction of Troy. Thespia, a city built upon the river of the same name, and Mount Helicon, which rises behind it; places consecrated to the muses, and from which that harmonious choir were called Thespiades and Heliconiades. The cave of Trophonius, who, being consulted as a soothsayer by the credulous neighbourhood, gave rise to the fable that Jupiter there uttered his responses, and that the persons who entered the cave to consult the oracle, were never afterwards seen to laugh. The straits of Thermopylæ, situated at the foot of Mount Oeta, where Leonidas and the 300 Spartans opposed the vast army of Xerxes, and gloriously perished to save their country from Persian slavery.

When we attempt to form an acquaintance with the first inhabitants of this region, we find them so involved in the darkness of antiquity, that it is impossible to discover their origin, to mark their character, or to describe their exploits. The fabulous muse of Greece informs us, that Jupiter, in the shape of a bull (probably in a ship, which, having that animal painted on its stern, bore that name,) carried off Europa from the court of Agenor king of Sidon to the island of Crete: that her father commanded Cadmus to go in quest of his sister, and not to return till she was found; that Cadmus, after a long and unsuccessful search, arriving at Delphos, in obedience to the oracle, followed the foot-steps of an ox, which was browsing in the fields; and that on the spot where that animal lay down, he built a citadel, which he called Cadmea from himself; laid the foundations of his capital, which he denominated Thebes; and to the country itself he gave the name Bœotia, from the ox (βους) which had been his guide. The learned, however, are not agreed concerning the country from which Cadmus and his associates migrated. Some think that they were natives of Thebes in Egypt, and that this new capital derived its name from that place; others that they came from Phenicia; but if we durst hazard a conjecture, we would suppose that they were Canaanites, of the family of the Cadmonites, (Genesis xv. 19.) or *Easterlings*, an appellation which they received from their inhabiting Mount Hermon, the eastern boundary of Canaan, from which place Hermione the wife of Cadmus derived her name; and that they fled from the invasion of Joshua, with whom they were cotemporary. It has, however, been maintained, that this region was called Cadmus by Cadmus, and that it received the name of Bœotia long after in this manner: Bœotius, the son of Neptune by Arne the daughter of Æolus king of Æolus in Thessaly, succeeding to his grandfather, called that kingdom Bœotia from his own name, and his capital Arne from the name of his mother. This Bœotia subsisted, as an independent state, upwards of 200 years. At the end of that period, the inhabitants were forced, by the Thessalians, to migrate to the country which the descendents of Cadmus still possessed; and obtaining there a settlement, called it Bœotia from the country which they had left. We, however, imagine that it bore that name from the time of Cadmus. As it is supposed that the rape of Europa took place about 1545 years after the flood, the kingdom of Bœotia must have been founded a short time afterwards. From Cadmus to Xanthus, the last of the Bœotian kings, a period of nearly 300 years elapsed. At his death the Bœotians, weary of kingly government, formed themselves into a republic, which continued till they were subdued by the Romans. But as this dynasty is chiefly known in history by the name of THEBES, we refer our readers to that article for an account of its exploits, both in its monarchical and its republican form.

As written laws, which only can circumscribe the will of the prince and secure the rights of the people, were unknown during the time of the Bœotian kings, a most arbitrary and tyrannic despotism was established. When the kingdom became a republic, the principal officers of state were, the prætor, or strategos, who presided in the supreme council, and had the chief command of the army. The bœotarchi, who formed the grand council of the nation, both in civil and military affairs, and who were empowered, not only to assist the prætor with their advice, but also to compel him to adopt it. The polemarchi, who administered justice in the various districts, and maintained the internal tranquillity of the state. Our knowledge of the Bœotian laws is very imperfect. It appears, however, that though neither merchants nor mechanics were allowed to exercise any office of government, till the expiration of ten years after they had retired from business, yet they were accounted citizens, an honour to which they were not admitted in any other Grecian state: That the parent who exposed his child was capitally punished; and if he was not able to support it, the magistrate had authority to assign it, as a slave, to any one willing to receive it: That marriage was contracted by bringing home the bride in a kind of car; the axle-tree of which, by being immediately burnt, informed the bride that she was never to desert the house of her husband. Robbery and piracy, which, at least in the early period of the state, were frequently practised, rendered property insecure; and the insecurity of property greatly obstructed the progress of agriculture and commerce. As pride and courage were prominent features in the Bœotian character, we allow, that the former sometimes inspired them with insolence, and the latter degenerated into cruelty; but their history, disfigured as it is by poetic fables, will not allow us to imagine that their annals were stained with deeds of greater atrocity than those which blackened the annals of neighbouring states. When we likewise recollect that the *Sacred Battalion*, a band of 300 young warriors, were raised and maintained and disciplined by this state; that their military evolutions were directed by the harmonious sounds of the flute; that their minds were animated by the most generous and manly sentiments; that their valour often triumphed over the power of Sparta, and at last covered with their bodies the ground on which they were stationed at the unfortunate battle of Cheronæa; we will readily acknowledge, that though the Bœotians might not be free from those vices which universally prevail when civilization is only in its infancy, yet they likewise exhibited, in no common degree, those virtues, which, though they may be softened and refined by art, must derive their origin and their vigour from nature. The men were generally healthy, strong, and active: the women tall, elegant, and beautiful. Horace asserts, that their minds were rendered dull by their thick and foggy atmosphere. But a country which could boast of that transcendent wisdom and valour which Epaminondas displayed on the fields of Leuctra and Mantinea—a country which inspired the rural lays of Hesiod, which Virgil did not disdain to imitate; and fired the soul of Pindar with those daring numbers, which Horace himself, in the happiest hour of inspiration, could scarcely hope to equal, might hear with contempt the witty sarcasm of that satirist; and we have no hesitation in attributing the little progress of the Bœotians in literature and the fine arts, not to the niggardness of nature, but to the want of proper education, and to their employments, which were better adapted to improve the powers of their bodies than of their minds. Letters, however, were known in Bœotia from the time of Cadmus, though the alphabet which he introduced contained only sixteen characters, and was not completed till many ages after. See Pausan. in *Bœot.* *Herod.* lib. v. *Diodor.* lib. iv. Hom. *Iliad.* lib. iii. iv. *Stat. Theb.* Bryant, *Anal. Anc. Myth.* *Univers. Hist.* vol. ii. p. 370. (N)

BOERHAAVE, Herman, a most distinguished physician, was born Dec. 31. 1668. He was son of the Rev. James Boerhaave, minister of the village of Voerhout, two miles from Leyden. Being intended by his father for the church, he was educated on a plan suited to that view, and distinguished himself by his proficiency, both at the public school of Leyden and at the university. When sixteen years of age, he lost his father; and his mother being thus left a widow with nine children, of whom the eldest was not yet seventeen, and with a very slender provision for their support, he found it difficult to obtain the means of prosecuting his education. At one time he was under the necessity of teaching mathematics to procure subsistence. In 1690, he took his degree in philosophy; and in an inaugural disputation on the distinction between matter and mind, he exposed, with great ingenuity and learning, the unsoundness of the principles of Epicurus, Hobbes, and Spinoza. While prosecuting the study of theology, that of nature had not been neglected by him, and at length it seemed to engross his whole attention. He entered, with the concurrence of his friends, on a regular course of medical education, and resolved to obtain a degree in physic before entering the church. Of all medical writers, he particularly admired Hippocrates and Sydenham. The former he considered as the source of medical science; and the latter he says, he repeatedly perused, and every time with greater eagerness. He made rapid and vast progress in all the branches of medical knowledge, anatomy, physiology, chemistry, botany, surgery, and medicine; and obtained a degree from the university of Harderwick in 1693.

But being still resolved to devote himself to the profession of a clergyman, he was on the point of petitioning for a licence to preach, when a report, unjustly spread, of his having revolted to the standard of Spinoza, excited so much popular prejudice against him, that he resolved to abandon his pursuit, and to apply himself wholly to the medical profession.

At first his practice was so small, that it was insufficient for his support; but he continued to supply the defect by teaching mathematics; till, on the death of Drelincourt, in 1701, he was appointed lecturer on the institutes of medicine at Leyden; and was successively professor of physic and botany, and of chemistry and botany, in that university. In 1714, he was made rector of the university, and physician to the hospital of St Augustine. The Academy of Sciences at Paris wrote to him about this time, requesting his correspondence on botany and physics, and elected him a member in 1728. The Royal Society of London elected him a member of their body in 1730.

He had filled with such distinction the various offices in which he had been placed, and had acquired so much fame by the publication of his celebrated *Aphorisms*, and other treatises, that Leyden was now become the school of medical science for Europe. Dr Matty says, the city was scarcely sufficient to contain the numbers of students who resorted to him. But in 1722, the course of his academical lectures, as well as his practice, was interrupted by an attack of rheumatism, so severe, that the history of it can hardly be perused without horror. He was confined to his bed for five months, and compelled to lie on his back without motion; as the slightest effort gave him exquisite pain. But he at length recovered beyond the expectation, and to the great joy, of all who knew him.

His malady, he says, was brought on by an imprudent transgression of those rules which he had so often been at pains to inculcate upon others. He rose one morning before light, and rashly exposed himself, while in a profuse perspiration, to the cold air and dews.

His medical skill seems here to have been of little avail; and it is worthy of remark, that his disease had never been described by medical writers as distinct from gout before Sydenham, in whose works only Boerhaave could find an account of his own disorder. It is observable, too, that, in the first edition of the *Aphorisms*, which was published in 1708, no notice is taken of rheumatism; but this disease appears in the subsequent editions; his attention having been but too strongly directed towards it. In the above most distressing, we had almost said scarcely tolerable situation, he set an admirable example of patience and resignation; and this he was enabled to do, not only from his steady acquiescence in the divine principles of Christianity, of which he never lost sight, but also, as he told a friend, from his revolving in his memory, as he lay whole days and nights without sleep, the stores of knowledge he had then treasured up, and thus diverting his attention from what he sometimes thought insupportable torment.

Having resumed his studies and labours, and pursued them with unremitting ardour for four years more, he again became so ill that his friends despaired of him. He recovered, however, so far as to be able to continue his lectures; but, in 1729, having had frequent returns of his disorder, he judged it prudent to resign the professorship of chemistry and botany.

From this time he lived more privately, but was far from being idle. Numerous patients consulted him from all parts of Europe, coming to him when their diseases would permit, and when they would not, transmitting to him their cases in writing, to ask his opinion and advice. Much of his time was also spent in revising his different works for new and improved editions, as well as in revising and publishing correct editions of many valuable works of other writers. Still, however, he enjoyed ease in comparison of his former mode of life; and he now chiefly resided at his country house, a short way from Leyden, with his wife and daughter, to whom he was greatly attached. His principal amusement was to visit and superintend the culture of the numerous plants in his extensive garden.

About the middle of 1737, he became affected by a disease which at last proved fatal. The following account of which, written by himself to a friend in London, fifteen days before he died, will, we should hope, be acceptable to our readers, not only as a specimen of the manner of this great master of the medical art, but as a historical account of the disease which deprived the world of such a valuable man, and as a proof of his admirable piety and resignation. "*Ætas, labor, corporisque opima pinguetudo, effecerant antè annum, ut inertibus refertum, grave, hebes, plenitudine turgens corpus, anhelum ad motus minimos, cum sensu suffocationis, pulsu mirificè anomalo, ineptum evaderet ad ullum motum. Urgebat præcipuè subsistens prorsus et interrupta respiratio ad prima somni initia; unde somnus prorsus prohibebatur, cum formidabili strangulationis molestiâ. Hinc hydropo pedum, crurum, femorum, scroti, præputii, et abdominis; quæ tamen omnia sublata. Sed dolor manet in abdomine, cum anxietate summâ, anhelitu suffocante et debilitate incredibili; somno pauco, eoque vago, per somnia turbatissimo; animo vero rebus agendis impar. Cum his luctor fessus, nec emergo; patienter expectans Dei jussa quibus resigno data, quæ sola amo et honoro unicè.*"

About three weeks before his death he was visited by his intimate friend, the Rev. Mr Schultens, to whom he said, that, during his long and painful illness, he had had a kind of experimental proof of the justness of the opinion he had always entertained concerning the distinct natures of soul and body, of the thinking and corporeal principles; for though the pains he endured had been long and exquisite, yet they had never been able to oppress him, or prevent the soul from being always master of itself, and resigned to the will of its Maker.

As death approached, he appeared less sensible of pain, and became more cheerful. He expired on the 23d of September 1738, betwixt four and five in the morning, in the 70th year of his age, greatly honoured and lamented.

His conversation towards his last moments was extremely affecting and edifying. He often expressed to the bystanders, how great were now the consolations of divine mercy as offered in the gospel, and particularly recommended to them the observation of that heavenly precept, of love to God and man, so strongly insisted on by the apostle John in his first epistle.

Thus died a man of extraordinary talents and worth, whose fame as a physician and a teacher knew no bounds but those of civilized society; whose genius fixed an era in the history of the healing art; and whose character commanded the veneration of all who knew it. The celebrated Haller, who was his pupil for two years, speaks of him with enthusiasm. "Permit me," says he, "to speak a little more at large of my beloved preceptor, whose erudition some, though few, will equal; but whose divine temper, kind to all, beneficent to foes and adversaries, detracting from no man's merit, and binding by favours even those who were daily objecting to his doctrines and discoveries, will scarcely be paralleled. I attended him," continues he, "from 1725 to 1727, and it is impossible to conceive a more eloquent, easy, and happy manner of expression than he employed." Indeed, the eloquence of Boerhaave was such, that his auditors were always sorry when his discourses were at an end. Original and important views, perspicuously and elegantly expressed, never failed to seize and fix the attention. His method of teaching was most luminous and satisfactory. Pupils flocked to him in crowds from all parts of Europe, and were not more delighted with his knowledge and eloquence, than won by his affability and attention. He not only guided them in their studies, but consoled them in their distresses, and relieved their wants. When Peter the Great of Russia visited Holland in 1715, he did not neglect to converse with Boerhaave. His fame is said to have extended itself even to the distant regions of China, from whence he received a letter, written to him by a mandarine, and addressed, "To the illustrious Boerhaave, physician in Europe."

Of his astonishing sagacity and penetration in detecting, at the first sight of a patient, such symptoms of disease as no ordinary observer could perceive, instances are related which would be incredible on any other than the most unquestionable testimony: Yet he was so far from presumption, or an overweening conceit of his own powers, that he was remarkably particular in his inquiries concerning his patients; well convinced, that to acquiesce in conjecture where it may be possible to obtain certainty, is either vanity or negligence, and that the man is inexcusable who slights any possible source of information, when the health, or perhaps the life, of his fellow creature is at stake. Haller says he was a successful practitioner, and cured the severest diseases by seemingly simple methods. Though he commenced practice, as we have seen, in very narrow circumstance, he died possessed of a fortune exceeding £300,000. Some have censured him as too parsimonious, but unjustly; for if he indulged not in luxury and expense, it did not arise from parsimoniousness, but from want of time. His avocations allowed him little leisure for the gaieties of life; but he was always liberal when fit opportunities presented themselves.

His habits of life were particularly simple. He rose early, usually at four in summer, and at five in winter, and could not be distinguished by his dress from the plainest citizens. Haller says of him, "*Tædia vitæ tentudine consolabatur. Vita ei simplex, calcei in horto lignei, in toto victu exilis, vestituque civis minoris et opificis alicujus similem se gerebat.*" His favourite exercise, till towards the latter part of his life, when he became corpulent, was riding on horseback; and when this could no longer be conveniently enjoyed, he spent much of his time in his garden. In personal stature he was above the middle size, robust and athletic in his make, and of great muscular strength. In his air and manner there was something so plain, that it might be almost accounted rough; yet there was, at the same time, something so majestic and great, accompanied by so much good nature, innocent facetiousness, and benevolence, that no man could look upon him without a mixed sentiment of love and veneration. Though grave and serious, he was fond of pleasantry, and both in his private conversation and public discourses used occasionally to indulge in a strain of delicate, good-humoured raillery, in so much, that his manner has been compared to that of Socrates, whose bust he is also said to have resembled in features. He was modest, but not timorous, and always cheerful. Calumny and detraction (which sometimes assailed even him) he never thought it necessary to refute, nor could they ever fret or sour his temper. He said they were sparks, which would go out of themselves if you did not blow them, and that the best way to get the better of malice, was to *live it down*.

Being one day asked by a friend, who admired his patience under great provocation, whether he knew what it was to be angry? He replied, with the utmost sincerity and frankness, that he was naturally of an irascible temper, but had attained this command over himself by reflection and prayer to God. He was, indeed, an admirable example of every moral and Christian virtue. Through his whole life he made it a rule to dedicate the first hour after he rose in the morning to religious retirement. This, he said, gave him vigour through the rest of the day, and enabled him to support the fatigues of his profession: For the tranquillity of the mind, he averred, was necessary to the health of the body, and could be maintained amid the distresses of life only by a well-grounded hope of the approbation of our Maker on Christian principles.

Aware that many great men had injured the reputation, and lessened the utility, of their writings by inattention to the graces of style, he made eloquence and poetry a principal object of study; and was a no less elegant scholar than a profound and ingenious philosopher.

His funeral oration was pronounced by his friend Schultens, and the city of Leyden erected an elegant monument to his memory, in the church of St Peter, with this inscription: *Salutifero Boerhaavii genio sacrum.*

He married, in 1709, Mary Drolenveaux, only daughter of the burgomaster of Leyden, by whom he had four children; three of whom died in their infancy, and the other, Joanna Maria, survived her father.

His genuine works, according to his own catalogue of them, and he declares, in 1732, that all others under his name are spurious, except some prefaces to new editions of books, are as follow: *Oratio de commendando studio Hippocratico*, 1701. *Oratio de usu ratiocinii Mechanici in Medicinâ*, 1703. *Oratio qua repurgatæ Medicinæ facilis asseritur Simplicitas*, 1709. *Oratio de comparando certo in Physicis*, 1715. *Oratia de Chemiâ errores suos expurgante*, 1718. *Oratio de Vita et Obitu Clarissimi Bernardi Albini*, 1721. *Oratio quam habui quum, honesta Missione impetrata, Botanicam et Chemicam Professionem publicè ponerem*, 1729. *Oratio de honore Medici servitute*, 1731. *Elementa Chemiæ quæ anniversario labore docuit in publicis privatisque scholis Hermannus Boerhaave*, 1732. *Institutionis medicæ in Usus Annuæ Exercitationis domesticos*, 1728. *Qui dein auctior aliquoties recusus*, in 8vo. *Aphorismi de cognoscendis et curandis morbis, in usum doctrinæ domesticæ*, 1709. *Qui dein aliquoties recusus*, in 8vo. *Index Plantarum quæ in Horto Academico Lugduno Batavo repcriuntur*, 1710, in 8vo. *Libellus de Materiâ Medicâ et Remediorum formulis*, 1719. *Index alter Plantarum quæ in Horto Academico Lugduno Batavo aluntur*, 1720, in 4to. *Atrocis nec descripti prius morbi Historia, secundum medicæ artis Leges conscripta*, 1724, in 8vo. *Atrocis rarissimique morbi Historia altera*, 1728, in 8vo. *Tractatus medicus de Lue Aphrodisiacâ*, 1728, in folio. His three principal works are, his Institutes, his Chemistry, and his Aphorisms; particularly the latter, which is perhaps more useful than any other book that has ever been written on the subject of medicine. He himself calls it "*libellum mole parvum, gravem materie, nec sine labore natum;*" and it is said to have had the honour of being translated even into the Arabic, and circulated in the Turkish empire. See Haller's *Biblioth. Med. Pract.* 1788. H. Boerhaavii *Op. omnia Med.* Veneticis, 1757. Math. Matty, *Essay sur le charactère du grand Medicin, ou eloge critique de H. Boerhaave*, 1747. Hutchinson's *Biograph. Med.* 1799. (x)

BOERHAVIA, a genus of plants of the class Monandria, and order Monogynia. See BOTANY. (w)

BOERO, BUERO, BURRO, BOURO, or BOURRO, the name of one of the Molucca islands, situated between Celebes and Ceram. It is about 54 miles long from east to west, and 40 from north to south, and was once subject to the king of Ternate. Cajeli, the capital, is situated at the bottom of a gulf of the same name, in a marshy plain, extending about four miles, between the rivers Soweill and Abbo, the latter of which is always turbid, and is the principal river in the island. The island is inhabited by Moors and Alfourians, the former of whom are strict Mahometans, and the latter a free people, who inhabit the inaccessible mountains in the interior. The Dutch company obtain from this island only black and white ebony, and other kinds of valuable wood. The other productions of Boero are pepper, cocoa nuts, bananas, shaddocks, lemons, citrons, bitter oranges, &c. The country is infested with enormous serpents, and with a smaller species of snakes. The rivers swarm with huge crocodiles, which often devour both men and beasts. The Fort of Defence is protected by a garrison of 25 men. See Bougainville's *Voyage*. (H)

BOETHIUS, FLAVIUS ANICIUS MANLIUS TORQUATUS SEVERINUS, the most eminent of the later Romans, was born at Rome about the year 470, and flourished in the reigns of the Emperors Zeno and Theodoric. He was deprived of his father at an early age, and thus succeeded to the patrimony and honours of a family so illustrious, that even kings and emperors ambitiously assumed its name. Several years of his youth were spent at Athens, where he prosecuted his studies under the direction of Proclus, with such indefatigable assiduity, as to make himself master of all the learning of the age. His sound and vigorous judgment preserved him from the affectation of mystery and magic, which then disgraced the Grecian schools; but he caught the spirit, and imitated the example, of Proclus and his predecessors, who endeavoured to reconcile the nervous sense and acute subtlety of Aristotle with the sublime but fanciful contemplations of Plato. On his return to Rome, he continued to pursue his studies with an eagerness unabated by the splendour and the numerous avocations of his exalted situation;

and soon gave proofs, in various publications, of the extent of his erudition, and the amazing versatility of his genius. His first work appears to have been a defence of the orthodox creed against the Arian, Eutychian, and Nestorian heresies; and he afterwards published a formal treatise upon the Trinity, which abounds not only with philosophical terms, but with metaphysical subtleties. Boethius appears to have been the first who employed the Aristotelian philosophy to explain the mysteries of religion: a plan which was afterwards very eagerly adopted by the school divines, and which, in their injudicious hands, became the source of such endless wrangling and error, as completely destroyed the spirit, and clouded the beauty, of the mild and pure religion of the gospel.

His next object was to make his countrymen acquainted with the arts and sciences, which had long flourished, though they were now on the decline, in Greece. With this view he translated, and illustrated by commentaries, the geometry of Euclid, the music of Pythagoras, the arithmetic of Nicomachus, the mechanics of Archimedes, the astronomy of Ptolemy, the theology of Plato, and the logic of Aristotle: "And he alone," says Gibbon, "was esteemed capable of describing the wonders of art, a sun-dial, a water-clock, or a sphere which represented the motions of the planets." In the midst of these important studies, Boethius never forgot his more essential duties as a citizen, and master of a family: his coffers, almost inexhaustible, were ever open for the relief of the indigent; and his eloquence, at that time unrivalled, was uniformly exerted in the cause of innocence, humanity, and justice. He now saw himself in possession of every thing requisite to his public respectability and private happiness. Allied by birth to the first nobles in the empire, his family grandeur was increased by his marriage with the daughter of Symmachus, who possessed every quality that could give pleasure to the nuptial union. His dignity and his acquirements well entitled him to aspire to the highest offices in the state; and his claims were felt and recognised by the Emperor Theodoric. He was exalted to the rank of consul and patrician: the important station of master of the offices, gave an honourable and useful employment to his talents; and when his two sons had grown up to manhood, he enjoyed the singular satisfaction of seeing them united in the consulship.

Universally esteemed and respected, caressed by his sovereign, and adored by his dependants, one circumstance alone threw a shade over his happiness, and at last completely reversed the fair scene which we have described. With the generous and independent spirit of a Roman patriot, Boethius could not see without deep regret the misfortunes of his country, ruled by a foreigner, and oppressed and insulted by barbarian conquerors. His authority had often checked the pride and tyranny of the royal officers; and his influence had rescued Paulianus from the dogs of the palace. The provincials, whose fortunes had become the prey of public and private rapacity, had often been relieved by his generosity; and he was the only person who was bold enough to oppose the insolence of the barbarians, elated by conquest, excited by avarice, and encouraged by impunity. "In these honourable contests," says the historian quoted above, "his spirit soared above the consideration of danger, and perhaps of prudence; and we may learn from the example of Cato, that a character of pure and inflexible virtue is the most apt to be misled by prejudice, to be heated by enthusiasm, and to confound private enmities with public justice."

When age had converted into a tyrant the wise and tolerant Theodoric, Boethius magnanimously resolved that he should not be degraded to the condition of a slave, and opposed, without fear, the sullen barbarian, who thought the safety of the senate incompatible with the stability of his throne. When the senator Albinus was accused, and already convicted of *hoping* the liberty of Rome, the eloquence of Boethius, animated by all the warmth of friendship and patriotism, was exerted in his defence. "If Albinus," he exclaimed, "be guilty, the senate and myself are all guilty of the same crime. If we are innocent, Albinus is equally entitled to the protection of the laws." If merely to hope for the liberty of Rome was criminal in the eyes of the tyrant, Boethius could not fail to incur his mortal resentment by the less equivocal avowal, that if he had known of a conspiracy, Theodoric never should. He was accordingly involved in the same charge with his client Albinus; their signature, which they denied as a forgery, was exhibited in the senate, affixed to the original address inviting the Greek emperor, Justin, to deliver Italy from the dominion of the Goths; and Trigilla, Congiastus, and Cyprianus, persons of the most infamous character, though of high rank, were suborned to attest the treasonable designs of the patrician. The senate, overawed by the power of the tyrant, yet unwilling too severely to condemn the most respected and illustrious of their members, pronounced against him a reluctant sentence of banishment; while Boethius, lamenting the servility and degeneracy of his countrymen, predicted, that none, after him, should be found guilty of the same offence. He was conveyed to the tower of Pavia, where he was closely imprisoned and loaded with fetters, expecting every moment the fatal mandate of his sovereign. It was in this dismal situation that he experienced the chief advantage of those studies to which he had devoted his youth. He beguiled the tedious interval between his imprisonment and death, by composing the *Consolation of Philosophy*, an incomparable treasure of sublime and delicate moral sentiments, but still more admirable, considering the barbarism of the age, and the situation of the author when it was written, for the classical purity and elegance of its style. The most judicious critics have not hesitated to compare the *Consolation of Philosophy* with the happiest productions of Plato and of Tully; and Bertius, one of the editors and commentators of Boethius, in a still loftier strain of panegyric, endeavours to account for the superior excellence of this performance by supposing, that, as men approach nearer their death, they feel something divine within them, and passing beyond the ordinary limits of mankind, speak, see, and think much nobler things than they could ever do before. This

Boethius.

work, written partly in prose, and partly in verse, is thrown into the form of a conference between the Author and Philosophy, who endeavours to soothe him in his afflictions. He begins by complaining of the miserable state to which he is reduced, when his divine instructor, to assuage his distresss, reminds him of the instability of fortune, and of the large portion of happiness which he had so long enjoyed. Yet the supreme good, she assures him, consists not in the wealth, the honour, or even the safety which he had lost, but in the enjoyment of God alone. Hence it follows that the good alone are in possession of real happiness; and although the wicked may often enjoy apparent felicity, and the virtuous may sink in occasional distress, this is only the natural result of the moral government of the Deity over beings free and accountable, whose actions and motives he now watches attentively, and whom he will afterwards equitably judge, to reward and punish them according to their deeds.

About a year, or somewhat more after his confinement, the messengers of death were dispatched by Theodoric, to terminate the sufferings of the virtuous and heroic sage. The manner of his execution is variously recorded. According to some historians, he was beheaded: but others inform us, that a strong cord was fastened round his head, and forcibly tightened till his eyes almost started from their sockets; and that, in this agonising state, he was beaten with clubs till he expired. Thus perished Boethius; a man against whom calumny has been able to allege nothing worse than a generous indignation against the oppressors of his country, and a patriotic eagerness for its liberty. "With Boethius," says Mr Harris, "the Latin tongue, and the last remains of Roman dignity, may be said to have sunk in the western world;" yet his genius survived to diffuse a ray of knowledge over the darker ages of the Latin world; and his virtues and sanctity were supposed by his credulous admirers to be honoured by the testimony of a miracle at his death. No author has ever been more popular than Boethius, especially before the revival of literature had restored to light the productions of the happier ages of Greece and Rome. His *Consolation of Philosophy* was translated by two of the most illustrious monarchs that ever filled the British throne, Alfred and Elizabeth. Chaucer translated it into prose, and a verse translation of it was printed in the monastery of Tavistock, in Devonshire, in 1525. It was likewise translated into English by Sir Richard Graham, secretary to King James II. who was committed to the Tower on a charge of high treason in 1690, and suffered a tedious imprisonment. His translation was printed at London in the year 1695. See Gibbon's *History*, vol. vii. p. 42—50. Enfield's *Lives of the Philosophers*, vol. ii. Le Clerk's *Biblioth. Chois.* tom. xvi. *General Dictionary*, vol. iii. (*k*)

BOG. See Draining.

BOGOTA. See Santa fe de Bogota.

BOHEMIA,

Bohemia.

A kingdom in Europe, forming part of the Austrian dominions, and bounded on the west by part of the electorate of Saxony, the principality of Culembach, and the Upper Palatinate; on the north by Misnia, Lusatia, and Silesia; on the east by Moravia, Silesia, and the county of Glatz; and on the south by Austria and Bavaria. It stretches from 48° 30′ to 51° 5′ N. Lat. in an oval figure of about 951 geographical square miles.

The whole country resembles an immense bason or concavity, and its bottom forms a plain considerably elevated above the level of the sea. It is surrounded on every side by high mountains; on the north-east by the Sudetes mountains, and the Riesengebürge; on the south-east and south, by the mountains of Moravia; on the west, by the Bohmerwaldgebürge, (Lat. *Sylva Gabreta*, or *Hercynia*,); and on the north, by the Erzgebürge. A very considerable portion of these mountains is composed of the first or oldest granite formation, on which rest gneiss, mica, slate, clay slate, various porphyries, and other primitive rocks; and these are covered with flœtz sandstone, limestone, and various rocks of the newer trap formation. Even the highest summits of the Bohmerwaldgebürge are covered with a kind of brushwood; but the elevated parts of the Riesengebürge are almost bare, and, in sheltered hollows, snow remains during the whole year. The loftiest and most naked branch of this chain is called, in German, Riesengebürge, the mountains of the giants. The Sudetes resemble an immense rampart, surmounted by a train of other ramparts, placed almost transversely. Their principal masses are composed of granite, round which, as a nucleus, are formed strata of porphyry, and mica and clay slate. On the south-east the granite disappears, and the mountains dwindle. This intermediate chain, which connects the Sudetes with the Carpathian Alps, is called by a general name Moravian Hills, or Gezenkergebürge, lowered mountains. The mountains of Carsleberg and Maunhast gird Bohemia on the south, and touch, on the west, the hills named the Forest of Bohemia, (Bohmer-Wald,) which are much less elevated than the Sudetes, and are clothed with verdure almost to the summits. At the western extremity of Bohemia, the Fichtelgebürge, or mountain of pines, rises to the height of 3630 Rhenish feet, and forms a common centre to the three chains which separate Franconia from Saxony, as well as Bohemia from Saxony and Bavaria. The Fichtelberg is an assemblage of mountains, precipices, shelves, and ravines; and on the summit there was formerly a lake, now converted into a marsh. Between Saxony and Bohemia, run the mountains named Erzgebürge, or metallic mountains, which join the Sudetes in Lusatia. On the side of Saxony, these mountains rise to the height of 3600 or 3700 feet above the level of the sea. On the side of Bohemia, they present a great number of peaks composed of basalt, whose imposing aspect adds greatly to the beauty of this picturesque country.

Among the natural curiosities which here present themselves, none is more remarkable than the labyrinth of rocks, near Adersbach, in the circle of Koenigingroetz. Innumerable rocks of freestone, placed perpendicularly, from 100 to 200 feet high, and of a circumference equal to half their height, forming thus great square towers, occupy a space of a league and two thirds in length, by half a league in breadth. The entrance into this immense group resembles that of an amphitheatre; the verdure of scattered trees and shrubs forms a striking contrast with the grey masses of rocks, the figures of which are fantastically varied. Through the midst of this singular scene winds a pleasant rivulet, which soon dashes into a grotto, where terror seems to reign. The echo of a thousand rocks reverberates the roar of this stupendous cascade.

Bohemia is so much elevated above the level of the sea, that all its rivers take their rise either in it, or immediately on its borders. Its principal river is the Elbe, (*Albe* of the mountaineers, *Labbe* of the Bohemians,) which rises from the western acclivity of the Weissen Wiese, (white meadow,) at the foot of the Schnee Koppe, (snow cap,) near to the Silesian frontier. It flows first southwards, then makes a great turn westwards, when it reaches nearly the middle of Bohemia, and from thence it flows northwest towards the Erzgebürge, through which it forces its way into Saxony. The principal tributary rivers are the Aupa, Erlitz, Orlitz, Dabrowa, Iser, the Moldau, which is the second principal river of the kingdom, and the Eger. The Elbe, with the accumulated waters of all these rivers, escapes from Bohemia at Winterberg, near Schandaw. As the opening through which the river forces its way is not only narrow, but bears evident marks of a great rent, and as the whole of Bohemia is surrounded by lofty ranges of mountains, it has been conjectured by the celebrated German mineralogist Werner, that this kingdom was formerly a great inland sea, or lake, in which was collected all the water from the surrounding mountains; that the water of this vast lake, or sea, had forced its way through the bounding rocks at the lowest point at Winterberg; and thus emptied itself, and formed the narrow rocky ravine through which the Elbe now flows in passing out of Bohemia into Saxony.

No country in Europe can boast of a finer climate than that of Bohemia. Italy itself has not a more delightful spring; and summer and winter, without ever prevailing here in their rigour, only introduce an agreeable variety of season. The mountains, which surround it on all sides, shelter it from every wind; and it is refreshed and beautified by several considerable rivers, the flow of which is so much facilitated by deep cavities in the middle of the vale, that no lakes or marshes are formed, to taint, by their malignant vapours, the salubrity of the air.

The excellence of the climate is equalled by the fertility of the soil. Every thing which can contribute to the comfort, and even pleasures of life, is here produced in abundance. Besides supplying its own numerous population, Bohemia exports great quantities of grain to Silesia, Saxony, and Austria. The crop in 1794 amounted to 24,012,507 measures of corn. Buckwheat, millet, pulse of different kinds, and exquisite fruits, are almost the spontaneous production of this generous soil. It is particularly remarkable for cherries of a very large size and delicious flavour; but almost every kind of fruit grows there in great perfection. In 1786, the number of fruit trees throughout the kingdom amounted to 7,649,489. Its mountains are covered with pines, firs, and various other species of trees; and the interior of the country is adorned by magnificent forests of oak. The aggregate extent of its woods in 1786 was not less than 7,700,000 feet, from which 2,164,174 fathoms of timber may be cut annually. Vineyards have not been cultivated in Bohemia with that diligence which the excellence of the soil and climate seems to invite. The annual produce of its vineyards is estimated at 26,326 eimers, and its most esteemed wines are those of Melnik and Podskalky. Saffron, ginger, calamus, and foxtail, are likewise produced in Bohemia in considerable quantities; but the favourite crop of this country is hops, which grow here in great profusion, and are altogether unequalled in the excellence of their quality. Its cattle, though not very numerous, are of the finest kind: in 1798, their number did not exceed 805,611. Its breed of horses, too, is uncommonly valuable; and in 1793, their number amounted to 130,774. The breed of sheep in this country, though originally of an inferior kind, has of late been much improved. Their number, in 1793, was 2,095,693, yielding annually 40,000 quintals of wool. The annual crop of hay is estimated at 8,101,799 quintals or hundred weight. Great herds of swine are reared in Bohemia, as well as numerous flocks of swans, ducks, and hens. Several thousands of cocks are annually exported into the surrounding provinces. The pheasants of this country are the most beautiful in the world. Its forests and mountains abound with the most interesting species of wild fowl and of game; wild boars, hares, wolves, bears, lynxes, foxes, badgers, beavers, otters, and martins; and its rivers and ponds swarm with various kinds of excellent fish.

State of agriculture.

Yet the bounty of nature is here but little seconded by the industry of man. The degrading and oppressive system of villainage damps every exertion of the peasant, and deprives him of all interest in the improvement of fields, the fertility of which, instead of multiplying his own comforts, only pampers the luxury of a haughty lord. Nothing can be more wretched than the condition of the peasantry in Bohemia. Their dwellings are mere ruins, which afford them scarcely the slightest shelter from the wind, the rain, and the cold. To each of these wretched abodes is allotted a piece of ground, with a cow or two, a pair of oxen, or a work horse. Their lords demand from them the labours of the whole week, allowing them only Sunday for the cultivation of their own little spot. In these circumstances, it cannot be wondered that Bohemia should be in general under the worst cultivation, and that even in this fertile country the scourge of famine should be occasionally felt. To prevent the recurrence of this evil, magazines of provisions have been established in various parts of the kingdom, from which, in cases of scarcity, the inhabitants receive the necessary supplies of food for themselves and their cattle.

Mineral productions.

If it be admitted as a general fact, that the mineral riches of a country correspond to the sterility of its surface, Bohemia at least must be allowed to be a remarkable exception; for while the fertility of its soil can scarcely be surpassed, its subterraneous treasures are likewise extremely valuable. Mines of gold have been found in various parts of the kingdom, but they are too scanty to be wrought with any advantage. Some rivers, too, wash down particles of that metal, but in very small quantities. The silver mines, which are pretty numerous in Bohemia, are richer and more profitable. The richest were those of Kuttenberg, but they are now inundated. There is one of considerable importance at Joachimsthal, where the counts of Schlik ordered crown pieces to be struck for the first time in 1619; and others less considerable are found in the circles of Pilsen and Bechin, as well as in the district of Elnbogen. The produce of these mines is about 2400 marks, of eight ounces, annually. Mines of iron are disseminated throughout the whole of Bohemia, and yield annually 193,400 quintals. There is an excellent copper mine in the district of Elnbogen; and the lead mines give about 6000 quintals a year. The copper of Bohemia is very frequently, and the lead always, mixed with a little silver. The tin of Bohemia is, next to that of England, the most valuable in the world; and its tin mines, besides the importance which they derive from their intrinsic excellence, are remarkable as being the termination of the tin mines in the east of Europe; nor are any found farther east till we reach Sumatra and Japan. There are ten mines of this metal in the circle of Saatz, and two in the circle of Leutmeritz; and these are sufficient for the supply of all the Austrian dominions. The net produce of all these mines, without including the iron, is estimated at one million of florins of Vienna. Cobalt abounds in various parts of the country; and its annual produce, which is at present about 11,000 quintals, might be much increased if the demand for it were greater.

There is abundance of zinc, arsenic, and calamine; some antimony, manganese, and bismuth. Mercury is found at Beraune, but in too small quantities to compensate for the expense of working it. Among the minerals in Bohemia we may likewise reckon sulphur and vitriol; and alum is so abundant, that 3500 quintals of it are sold annually for about 36,000 florins. Black coal (pitcoal) and brown coal are in several places, and likewise porcelain clay, and limestone. There are likewise rich quarries of beautiful marble, especially at Tesin in the circle of Beraune. Jasper is found in considerable quantities, as well as alabaster, asbestus, serpentine, and other minerals of a similar kind. Several gems are found in Bohemia, viz. sapphire, topaz, precious garnet, hyacinth, and pyrope. The sapphires are small and of but little value; the topazes scarcely equal those of Saxony; the precious garnet has a good fire and water; the hyacinths are small, and not fit for the purposes of jewellery; and the pyrope, (the carbo pyropus of the ancients,) is remarkable for its fine deep blood-red colour and great transparency, and is in high estimation. Very fine agates occur in various parts of Bohemia. In regard to the rocks of this country, we may remark that it contains nearly all those enumerated and described in the Wernerian geognosy. Pearls are fished in the stream of Waltava, and mother-of-pearl is found near Budweis, in the circle of Bechin. Bohemia is likewise celebrated for its mineral waters, which not only attract a multitude of strangers, but are conveyed to every part of Germany.

Man tures

Before the peace of Hubertsburg, which was concluded in the year 1763, the manufactures of Bohemia were very inconsiderable; but since that æra they have improved so rapidly, that foreign articles are almost wholly excluded from the Bohemian market by the cheapness and superior quality of those fabricated at home. Bohemia is particularly celebrated for its hardware, woollen and silken stuffs, and glass of a very fine quality. Its pottery, too, is excellent; and its paper works, which have the advantage of uncommonly pure water, produce paper of the best colour and texture, both for writing and printing. This country excels likewise in its manufactures of delf ware, composition stones, mirrors, needles, firearms, tinwork, hats, (made chiefly of the fur of hares,) gloves, stuffs, stockings, all kinds of jewellery, laces, cambric, and linen. An accurate idea of the manufactures of Bohemia may be formed from the following statement. In 1801, it contained 321,720 spinners of linen thread, and 85,335 manufacturers of linen cloths, ribbands, &c. who were employed at 41,142 looms: the produce of their industry amounted to 9,810,900 pieces of linen, the value of which was about twenty millions of florins. The manufacture of lace employed 16,295 persons, and 1308 were engaged in making veils and cambric. There were 1686 bleaching greens for thread, and 1150 for linen. At the same time this country reckoned 50,614 spinners of wool, 24,563 manufacturers, and 1128 venders of woollen cloth: the value of this manufacture amounted to eight millions of florins. The cotton manufacture employed 31,902 spinners, and 8769 weavers, who wrought at 5830 looms. The town of Prague alone fabricated, at 350 looms, 12,000 dozens of pairs of stockings; the circle of Burzlaw 1650 dozens. There were 360 manufacturers of silken stuffs, who had 166 looms; 630 manufacturers of silk ribbands, and 483 looms; so far back as 1782, there were 70 looms for silk hose, and 111 manufacturers. The whole of the silk manufacture was estimated at 448,260 florins. There were at the same date (1801) 782 paper-makers, who made paper to the value of 181,000 florins; besides a great quantity of pasteboard, parchment, and cards. In 1796, there was sold leather to the value of 915,555 florins, and gloves to the value of 85,000. In 1801, there were 179 forges for iron work, which employed 2517 persons; twelve wire manufactures, in which there are 293 artizans; two manufactures of firearms with thirty workmen and sixty-two forgers; thirty-five forgers of scythes, 185 armourers, fifteen file-makers, 382 nailers, and sixty-three cutlers. In the same year, the number of glass-works in Bohemia amounted to 78; which employed 1821 workmen. The value of the glass vessels annually exported to Spain, America, Russia, and the Levant, is estimated at two millions and a half of florins. Besides these works, there are six manufactures of mirrors, in which are employed 282 workmen; the sale of the two manufactures at Pirnstein amounts annually to about 60,000 florins. The composition stones of Turnau employ 139 workmen, and bring in 40,600 florins a year. The two manufactures of granates at Dlaskowetz and Swietla bring in only 3000 florins. The manufacture of white starch and hair powder brings in 123,680 florins. There are fifty gold and silver smiths, the value of whose workmanship does not exceed 140,000 florins. For copper work there are eleven forges, and for brass there is one forge and fifty-four workmen; the value of this manufacture amounts to about 140,000 florins. The founderies which supply the whole empire with artillery and bells, are in Bohemia and Lower Austria. The value of the tin manufacture may be estimated at 56,100 florins annually. Of smalt there are eight manufactures, which export to the value of 72,000 florins; there are likewise manufactures of sulphuric acid, which bring in about 13,884 florins.

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erce.

There are few countries where the balance of trade is more favourable than in Bohemia, for its commerce consists almost entirely of exportation. Besides the cheapness and excellent quality of its home manufactures, the commerce of importation is extremely limited in this country by the want of capital, and the severe prohibition against the introduction of foreign commodities, or the heavy duties to which they are liable. There is one circumstance, however, extremely prejudicial to the interests of the natives; and that is, the disproportionate number of Jews, and, in some districts, of Greeks and Armenians, who have engrossed almost all the trade of the country. "It is a demonstrable and notorious fact," say Schreyer, in his work on the commerce and manufactures of Bohemia, "that in every town, and in every place where the Jews are established, the Christian tradesmen are reduced to the most wretched condition, and that the Jews have enriched themselves at their expense." The countries with which Bohemia carries on the most extensive traffic, are Austria, Spain, Portugal, Italy, and Turkey. Of the quantity and value of its trade, some idea may be formed from the statement which we have already given of its manufactures. The superior elegance which the Bohemians have attained in cutting and polishing flint-glass, occasions such a demand for their glass vessels, that they are sent not only to most of the European nations, but even to America.

The administration of commerce in Bohemia is entrusted to a chamber of commerce, resident at Prague, and subordinate to that of Vienna. This chamber consists of a president, who is, at the same time, a privy counsellor, of six counsellors, and some other officers. Subordinate to them are eight inspectors of the provinces, who make regular tours through the districts assigned them, to examine the various factories, and give in a report of them to the chamber. In cases of importance, such as the advance of funds, the nomination of commissaries and factors, granting new privileges, erecting new manufactures, the interdiction of foreign commodities, the raising or lowering customs and imposts, &c. The chamber of commerce can decree nothing without first consulting the board at Vienna, and receiving its directions. The exchequer of commerce has considerable revenues, and, in case of being exhausted, is supplied by that of Vienna. The interior commerce of Bohemia is much facilitated by the excellence of the roads. Ten grand roads issue from Prague, and run through the whole country in an invariable line. In many places they are supported by mason work; and there are deep ditches on both sides, to facilitate the flow of the waters. These roads were completed at the expense of several millions of florins, though the tenantry were obliged to give their labour without hire. Two creutzers, equivalent to about 1s. 11d. are paid at every stage, for defraying the expense of making and repairing them. The Empress and Queen Maria Theresa, established, in 1749, a regular mail to run from Vienna to Prague, and another from Prague to Vienna, both to favour commerce, by the facility of intercourse between the two capitals, and to furnish travellers with proper accommodation.

History.

The name Bohemia is derived from the German Boehman, which signifies *the residence of the Boii.* The Boii were a branch of the Celts, who, under the command of Sigovesus, passed over from Gaul into Germany, about 600 years before the Christian æra. Proceeding as far as the frontiers of the Quadi and Sarmatians, they settled in that part of the Hercynian forest which then covered Bohemia. In the reign of Augustus they were invaded by the Marcomanni, who expelled them, and took possession of their territory. Some of the conquered nation, however, still cantoned in Bohemia, though the greater part of them took refuge in Noricum, the modern Bavaria. The Marcomanni remained in possession of Bohemia till the 6th century, when they were, in their turn, attacked and dispossessed by the Sclavonians, under the command of Czechow. This leader governed with such clemency and moderation, that his name is still cherished with reverence by the Bohemians, who take particular pride in the appellation of Czechs, or Czechowians. In those countries, indeed, where the Sclavonian language is spoken, they are known by no other name. Czechow found the country almost in a state of nature, covered with wood, and occupied by herds of wild cattle, which no owner could claim. He taught the savage inhabitants to cultivate the ground, and to rear crops of corn, and thus rendered them acquainted with some of the comforts of life, and prepared them for the restrictions and the advantages of regular government. We have no means of ascertaining what particular form of government was established by Czechow, or what title he assumed; but the title of duke was first adopted in Bohemia by Premislaus, who flourished about the commencement of the eighth century. Premislaus is said to have founded the city of Prague, and to have distributed his subjects into different ranks: the government was transmitted to his descendants; one of whom, named Borzivori, embraced the Christian religion about the close of the ninth century, and found means, not without some violent struggles, to establish it throughout his dominions. Upon the death of his son Wratislaus, his widow, Drahomira, an inveterate enemy to the Christians, massacred about 300 of them in one night, burnt their temples, and compelled them to surrender their arms. Her son, Wenceslaus II. was a zealous friend of the Christians, but had not reigned many years when he was murdered by his brother, Boleslaus I. surnamed the Cruel, who persecuted the Christians with unrelenting rigour, and forced them to abandon the kingdom. They were again protected and cherished by his son, Boleslaus II. surnamed the Pious, who founded and endowed a number of churches, and obtained leave from Pope John IX. to create a bishop at Prague. An insurrection of his subjects, occasioned by their dislike to some reforms which he attempted to introduce, was quelled by the Christians, aided by the Jews, who, in return for this service, were allowed to build a synagogue in the capital. The ducal form of government continued till the year 1086, when Wratislaus II. was invested with the dignity of king by the Emperor Henry IV. who at the same time gave him possession of Lusatia, Moravia, and Silesia. The regal title, however, was at this time confined to Wratislaus himself; and it was not till the close of the twelfth century, or the commencement of the thirteenth, that the sovereigns of Bohemia were permanently honoured with the appellation of kings. From their attachment to the interest of the Emperor Otho, Premislaus II. who began to reign in 1199, and his immediate successors, were styled Othogari. Premislaus Othogar III. who succeeded to the throne in 1255, obtained possession by conquest of Austria, Carinthia, Stiria, and other southern provinces, and, marching into Prussia for the defence of the Christians, defeated his opposers in several engagements, and prevailed on many of the people to embrace the Christian faith. On his return to Bohemia, the imperial crown was tendered to him, but he rejected it with disdain. It was afterwards given to Rodolph, count of Hapsburgh, to whom Premislaus refused to do homage, or to receive from him the investiture of his estates. He was at length compelled, however, to submit, and to deliver five standards to Rodolph, for the five fiefs which he held. A reconciliation took place between these rival monarchs, and Othogar was invested in Bohemia and Moravia, on condition of renouncing Austria, Stiria, and Carinthia. Premislaus was succeeded, in 1278, by Wenceslaus V. who was likewise elected king of Poland, and was offered the sceptre of Hungary, which he refused in favour of his son. In 1310, this dynasty became extinct; and the Bohemian sceptre fell to John, son of the Emperor Henry VII. of the family of Luxembourg, who had married the youngest sister of Wenceslaus VI. John resigned the kingdom of Bohemia to his son Charles, and, having procured for him the imperial dignity, proceeded with him to France to assist Philip against the English. He fell in the battle of Cressy, in 1346. The Emperor Charles IV. created his brother John, Marquis of Moravia; established an university at Prague, upon the plan of that at Paris; and engaged Pope Clement VI. to erect the see of Prague into an archbishopric, assigning to the archbishop the official privilege of crowning the king of Bohemia. This public spirited monarch enlarged his capital by the addition of the new city, in which he founded the college of Carlstein; reduced the laws of the kingdom into a written code, known by the name of the Caroline Constitutions; and projected the junction of the Moldau and the Danube by means of a canal, which was begun before his death, but the completion of which has been found impracticable. He was succeeded by his son Wenceslaus VII. a profligate and tyrannical prince, during whose reign the doctrines of reformation were introduced into Bohemia by John Huss and Jerome of Prague. On the sudden death of Wenceslaus, the Hussites, headed by John Zisca, acquired considerable strength; and when Sigismund, who succeeded his brother as king of Bohemia and emperor of Germany, advanced from Hungary to take possession of the throne, he was met by their deputies, who entreated that he would allow them to worship God according to their conscience. Their petition was rejected; and a civil war ensued, in which the troops of Sigismund were frequently defeated. At length, after an opposition of sixteen years, he made several important concessions in favour of the Hussites, and was admitted into the capital with great solemnity, and much apparent joy. Sigismund was succeeded, in 1438, by his son-in-law, Albert of Austria, who continued in possession of the crown, though not without considerable opposition, for 33 years, when Uladislaus, already king of Poland, was elected by a majority of the sates, and soon after invested by the emperor. His son Lewis, who succeeded him in 1516, had reigned only ten years, when he was defeated by the Turks at Mohatz, and was drowned in the Danube, in endeavouring to make his escape. The sceptres of Bohemia and of Hungary now passed into the hands of Ferdinand, archduke of Austria, and infant of Spain, who had married Anne, the only daughter of Uladislaus. He was afterwards elected emperor, and, at a diet of the states, held in 1547, he declared the kingdom hereditary and absolute. Since that time, both the imperial crown and that of Bohemia have continued in the house of Austria. The immediate successors of Ferdinand made no unwarrantable abuse of their arbitrary power; but the cruel and violent proceedings of Ferdinand II. roused the Bohemians to revolt, and induced the Protestant princes to combine for his destruction. The crown was torn from his head, and presented to the elector palatine. A civil war continued for 30 years to distract Bohemia, and so dreadful were its horrors, that more than 30,000 families are said to have taken refuge at this time in foreign countries. Some idea may be formed of the desolations occasioned by this revolution, from this striking fact, that, in the reign of Rodolphus, scarcely two centuries ago, the population of Bohemia amounted to three millions of souls, whereas, after the civil wars, it did not exceed four hundred thousand. After the peace of Westphalia, Ferdinand III. and his successors remained in tranquil possession of the throne of Bohemia, till the death of Charles VI. in 1740, when the elector of Bavaria preferred his claim to the sovereignty of that country. This claim gave rise to a new war, and Bohemia was again ravaged by fire and sword. Peace was restored in 1745, since which time, the right of the house of Austria to the Bohemian crown has never been disputed. As a prince of the empire, the king of Bohemia is the first secular elector, and does homage to the emperor for his states. In every other respect he acts as an independent sovereign, nor is there any appeal from the decrees of his tribunals to the tribunals of the emperor. He is hereditary archbutler of the holy Roman empire, and from this office derives a right of voting for the king of the Romans. Bohemia, though a genuine state of the Roman empire, was exempted by Ferdinand II. from contributing to its taxes, and rendered independent of the jurisdiction of the supreme judicatory of the empire. At an act of the diet, called the Admission, held in 1708, it was acknowledged by the three colleges of the empire, that the king of Bohemia has an unquestionable right to sit and vote in all its assemblies; and, at the same time, the emperor came under an engagement to pay for his hereditary kingdom of Bavaria, and the countries belonging to it, his electoral proportion of all taxes and imposts to the empire and circle, besides 300 florins annually to the chamber judicatory. The states of the empire resolved, at the same time, to take the kingdom of Bohemia under their protection.

Bohemia was fomerly divided into sixteen departments; but a new division was adopted by the states assembled in diet in 1714, according to which it was distributed into twelve circles, Haurzimer, Pilsner, Leutmeritzer, Konigingratzen, Rakowitzen, Chrudimer, Prachiner, Slaner, Bunzlawer, Saatzer, Czaslawer, and Bechiner. To these circles must be added the territory of Eger, which is not included in any of them. This division was approved of by Charles VI., who ratified it by a particular decree.

The government of Bohemia is entrusted to six courts, viz. the council of the regency, or great royal council, which is composed of the great judge, or burgrave of Bohemia, with eighteen lieutenants of the king, and other assessors; the council, or superior chamber of justice, in which the grand master of the kingdom presides; the chamber of fiefs; the new tribunal, for judging the appeals of the German vassals, having a president, vice-president, and other assessors; the royal chamber of finances, having a president, and vice-president; and the chancery, which always follows the court. The states consist of the clergy, nobility, and deputies from several towns, who meet annually at Prague, rather to receive the orders of the court than to enact any decrees of their own.

The Bohemians are in general handsome, active, and strong. Dubravius, bishop of Olmutz, who wrote in the 16th century, thus describes his countrymen in the fanciful language of that age. "As this land is under the influence of the lion, so its inhabitants have the qualities of that noble animal. Their high breast, their sparkling eyes, their long and thick hair, their vigorous limbs, their strength, their courage, their resistance to obstacles, every circumstance shews evidently that the lion is their star, as he is their emblem." They are without comparison the best of the imperial troops. None of those troops can bear up, as the Bohemians do, under the fatigues of war. The state of poverty in which their peasantry live, gives them habits of temperance, which at once invigorate their constitution, and render them incredibly patient of hunger, to every German soldier more formidable than death; and the system of feudal servitude which here prevails in all its rigour, accustoms them from their infancy to unlimited obedience, the first of military virtues.—No middle rank is known in Bohemia; for there every man is either a petty sovereign or a slave. Of late, indeed, the peasantry on the imperial demesnes have been released from the bonds of feudal slavery, and it is to be hoped that the benevolent example of the emperor will be generally followed by the Bohemian nobility. Till that time, it is in vain to expect any improvement in science or the arts; for a land of freedom is their only congenial soil.—Bohemia can boast, indeed, of several public seminaries; an university, twelve gymnasia, 2219 German schools, 200 schools of industry, and 33 ladies' schools. Yet learning is almost wholly neglected; though the success of those few who have applied to study prove that this neglect is owing rather to the circumstances of the country, than to any want of genius in its inhabitants. They are uncommonly fond of music; and the orchestras of Prague are said to excel even those of Paris in exactness of harmony, and brilliancy of execution. In general they are addicted to travelling; and when in foreign countries, live in the greatest amity, and repose in one another unbounded confidence.

Bohemia contains 250 cities, the principal of which is Prague; 308 borough towns; 11,455 villages; and 430,000 houses. The following official Table, published in 1786, will give an idea of the proportion which exists in Bohemia between the different kinds of rural economy:

	Sq. Acres.	Sq. Fathoms.
Arable land	3,609,360	776
Fish ponds	67,115	1373
Fields	220,136	1393
Meadows	978,393	1066
Gardens	85,712	722
Ponds used as meadows	65,515	970
Pastures and heath	613,131	1209
Vineyards	4,482	672
Woods	2,219,811	575
Total	7,783,660	8738

Its contributions to the empire, according to the manual of Frankfort in 1803, amounted to 15,736,000 florins; according to Hoeck, 15,500,000; according to Ochart, (1803) 16,500,000 florins. Population 3,022,000.

The established religion of the country is Popery; but by the humane and judicious regulations of Joseph II. both Protestants and Jews are allowed the free exercise of their worship. See *Topographie et Statistique de la Boheme*, par Schaller, Riegger, Schreger, and Stransky. *Tableau Statistique de la Monarchie Autrichienne*, par M. M. Raymond et Roth, (1809). *Annales des Voyages, &c.* par Malte Brun, tom. vii. (1809.) Peuchet's *Dictionnaire de* *la Geographie Commerçante. Encyclopedie Methodique.* Riesbeck's *Travels*, vol. ii. (*k*)

BOHUS, or Bahus, a province of Sweden, bounded on the north by Norway, on the west by the Schagger-rack, and on the south and east by West Gothland. It extends about 100 miles from north to south, and about 20 from east to west. The country is productive, and watered by rivers and lakes, which produce plenty of fish. Wood, fish, pitch, tallow, hides, and lime, are its principal articles for exportation.

This province takes its name from a fortified island situated at the southern extremity of the province, and encircled by two branches of the Gotha. The fortress, which is built on a rock, was erected in 1309. Its situation is strong, and it is garrisoned by 100 men. (*j*)

BOKHAR. See Bucharia.

BOII. See Cæsar, *Bell. Gall.* lib. i. cap. 28; lib. vii. cap. 17. *Univers. Hist.* vol. xi. p. 212; vol. xii. p. 42, 144, 280, 345, 348, 452; vol. xiii. p. 161, 517 (N.); vol. xvii. p. 595; vol. xix. p. 471; and Bohemia, p. 635. (*w*)

BOILEAU, Nicolas, (Sieur Despreaux), one of the most able poets whom France has produced. He lived during the reign of Louis XIV. and rose to a high distinction in the cluster of wits, whose coexistence has ranked that period among the golden ages of literature. He was born in 1636; and his various works were successively offered to the public, between 1666 and 1707. He sprung, according to his own information, from a race of lawyers (*Fils d'un pere Greffier, né d'ayeux Avocats,*) and was the youngest of three brothers, all of whom were ambitious of writing for the public. The oldest, an advocate, produced a life of Epictetus, and a translation of his philosophy from the abridged view of it supplied by Arrian. He also composed occasional verses, of which a collection was published after his death. Jacques, the second brother, was Dean of the Faculty of Divinity in Paris, and a voluminous author on ecclesiastical subjects. We shall mention the titles of two of his works, for the amusement of those, whose more rational faith will tempt them to smile at the trifles, to which the dignitaries of the Gallic church attached a serious importance. One treatise of the Dean was, *De tactibus impudicis, dans lequel il prouve que ces sortes d'attouchemens sont des pechez mortals:* and another, *De re vestiariâ hominis sacri, dans lequel il pretend qu'il est assez indifferens aux Ecclesiastiques de porter des habits trop longs ou trop courts.* Nicolas having finished his academical course at the college of Beauvais, engaged, by the persuasion of his father, in the study of law; a study, to the repulsive inelegance of which, both France and England are indebted for some of their favourite poets. By apprising a youth of the mental exertions most uncongenial to his taste, it leads him, by that species of association resulting from contrariety, to those in which he delights; while a profession less hostile to the play of imagination, might have occupied him sufficiently to prevent the discovery. Boileau, however, proceeded far enough to be called to the bar. On quitting it, he became a student of theology, at the Sorbonne; but was again disgusted, and says that here he found Chicanery had only shifted her dress. After this repetition of disappointment, he resolved to indulge his literary propensities, without the interruption even of a literary profession, though he humorously acknowledges that his relations were displeased with the resolution:

> *La famille en palit, et vit en fremissant*
> *Dans la Poudre du Greffe un poete naissant.*
> *On vit avec horreur une muse effrenée*
> *Dormir ches un Greffier la grasse matinée.*

To poetry, in which he had both delighted and excelled at Beauvais, he now returned with fresh avidity; and it may be presumed that, even as a poet, he reaped some advantage from his two unsuccessful experiments to alter his destination. They had acquainted him with characters and topics, at which the satirist has frequent occasion to glance, and his acquaintance with which enabled him to sharpen the poignancy, and enrich the humour of his principal production. In France, as in Britain, the public taste was, at this period, extremely vicious, and authors had become popular, by exposing whose faults, and thus obliquely correcting their admirers, Boileau began to prepare the latter for a favourable reception of his own attempts to resist the graceful simplicity of the ancients. In this application of his talents we perceive their early vigour; for to outrun the judgment of our age, to resist the current of fashion, and to reject the support of popular decisions, are the efforts of no ordinary mind, nor is genius less manifest in leading back from error, than in leading forward to truth. The Satires of Boileau, which he wrote with this design, being admired in manuscript, and surreptitiously printed, an accurate edition of them was published by himself in 1666. Their appearance enraged the host of minor poets, who loudly complained of the introduction of their names; but these complaints only served to aggravate their sentence, by provoking Boileau to a severe and sarcastic apology in his 9th satire. His independence, however, was more conspicuous in the affairs of literature, than in those of life: for Horace was not more profuse of incense to Augustus, than Boileau to Louis, who was then the darling of Fortune, and therefore the idol of subjects, to whose national egotism, success is virtue. To that prince he addressed two epistles, on his different atchievements, and also an ode on the surrender of Namur, which shews that its author had misjudged his powers, when he attempted to follow Horace into the higher regions of Parnassus.

Of his *Lutrin*, which he says, in the original preface, was the first attempt of any French writer in *heroic comic* poetry, four cantos were published in 1674, and two more added in 1683. Boileau at first was anxious to conceal the origin of this masterly production. In his preface he misled the reader, by a false account of it; but, in 1683, he threw off the disguise, and acknowledged that the poem was founded on a quarrel between the treasurer and chanter of the Holy Chapel at Paris, about the position of a reading desk. His next publications were the *Art of Poetry*, and a translation of *Longinus*, with notes, which exhibit much critical penetration and sagacity.

These works were not only relished but rewarded by Louis, who bestowed a pension on their author, and appointed him jointly with his intimate friend, the celebrated Racine, to write the history of his reign. To improve their qualifications for this duty, the two royal historiographers visited the army in Flanders, which was then engaged in the siege of Ypres. The duty, however, notwithstanding this pompous preparation, was never executed. It is curious to observe, that the illustration of the military exploits of Marlborough, like those of his royal antagonist, should have been entrusted to two poets (Glover and Mallet), and that in both cases, by an additional coincidence, the reward should have been conferred, and the task neglected. In 1683, Boileau was elected a member of the Academie Françoise; and, soon after, of the Academie des Inscriptions. To the former of these he published an address of thanks. About this time a violent controversy had arisen in France respecting the comparative merit of the ancient and modern authors, in which Boileau took a zealous part, as an advocate for those classical writers, the successful imitation of whom is among his principal merits. His chief opponent was Perrault, and the controversial ardour of the disputants produced many valuable additions to the maxims of criticism, though it was also the unfortunate cause of much personal animosity. With Fontenelle the quarrel of Boileau never abated, but with Perrault it terminated in a cordial reconciliation, of which the poet, in the triumph of a benevolent nature, hastened to apprise the public. Boileau, we have seen, was a successful courtier; and Louis, who must have possessed a part of that taste which he affected, added to his pecuniary favours the personal distinction of reserving a weekly hour for conversation with the poet. On the death of Racine, however, his friend and colleague withdrew from court, and dividing his time between the country and the capital, slid down the descent of life with more enjoyment than is the usual lot of literary genius. Like Pope, whom he resembled in his moral as well as in his mental character, but unlike the majority of other poets, he was addicted to no dissipation, and so careful to suit his expenses to his means, that he even incurred the imputation of avarice. Pope, by his figure and infirmities, and Boileau, as is supposed, by the effects of an accident, in an early operation for the stone, were deterred from certain gross pursuits, which have embittered and abridged the days of numbers, to whom mankind are indebted for their most refined gratifications. After enduring, with patient serenity, the frequent intimations of approaching dissolution, in pain, faintings, and fever, Boileau died of water in the chest, on the 11th of March 1711, in his 75th year.

The character of Boileau differed widely from what the circumstances of his life would lead us to expect. In general, when men abandon a profession for the seductions of poetry, this radical irregularity diminishes their dread of others, and involves them in errors, for which the pleasure derived from their genius cannot always purchase our indulgence. The case was otherwise with Boileau, whose conduct was guided by the same good sense and correctness which chiefly recommend his compositions. As he was not among that elevated order of poets, whose loftiness occasionally swells into extravagance, neither did his actions exhibit any of that negligent vehemence, by which the former too often defraud themselves of outward respect and inward repose. He had, by his own information, in his fifth epistle, a sufficient patrimony to warrant the indulgence of his peculiar taste; and though he was certainly too lavish of courtly adulation, with which even his *Lutrin* is artfully interlarded, yet this proceeded more from the contagion of universal practice, than from a profligate or parasitical cupidity. The force of mind, which qualified him to judge for himself, and to oppose the prevailing corruptions in literature, was not sufficient to make him stand alone, in a hopeless effort to separate triumph from applause, or to measure splendid actions by moral rules, which he knew the loyal vanity of Frenchmen would reject. The esteem which he deserved, appears from the number, the cordiality, and the duration of his friendships; and from the encomiums which his worth extorted even from those whose works he had ridiculed. Though his intimacy with Racine was so tender and impassioned, as to make the latter, on his deathbed, rejoice at escaping the misfortune of surviving him, yet such was the benignity of his nature, and such his uniform sympathy with genius, that when Corneille, the rival of his friend, was about to lose his pension, he sued with success to Madame Maintenon for its continuance, which he offered to purchase by the resignation of his own. From the charge of avarice he ought to be absolved, by a fact so decisive, as well as by his generosity to Patra, (the chosen censor of his works before publication,) whose library he not only purchased at a price much greater than distress would have compelled its possessor to accept, but also allowed him to retain it for life. In the catalogue of poets, it is a relief to the mind to discover one whose virtues we can thus extol; nor is it among the slenderest merits of his sovereign, that he was studying the comforts of those who had added to his rational pleasures, while Butler and Otway were amusing a prince who permitted them to starve.

As a writer, Boileau was more distinguished by rectitude of judgment, than by richness of imagination. He was, therefore, less qualified to invent, than to improve the inventions of others; and though he could seldom create new materials for poetry, yet of those which were prepared, he could frame a more chaste and beautiful edifice than preceding architects. Though far from deficiency in original thoughts, yet his singular power of giving the gloss of novelty to the ideas of others, suggested to the Journalists of Trevoux a charge of plagiarism, which roused him, towards the end of his life, to a severe reply, in his epistle "on Equivocation." Plagiarism was a term by no means applicable to the practice of Boileau, which is most happily described by La Breiyere, when he says, "*Que Despreaux paroissoit creer les pensees d'autrui*;" and by Dryden, when he observes of Jonson, "he has done his robberies so openly, that one may see he fears not to be taxed by any law. He invades authors like a monarch; and what would be theft in other poets, is only victory in him." Boileau appears to have looked with comparative indifference on the charms of external nature, and even on human conduct, when modified by lofty passions, or extraordinary situations. Like Pope, he preferred the study of man as he appears in ordinary life, or as he is fashioned by local and accidental habits. His genius, therefore, t[illegible] to ethical, didactic, and satirical poetry; and this circumscription of his ambition left him more at liberty to attend to the minuter decorations of his art. His familiarity with ancient authors, which, as it was not conspicuous in his youth, must have been owing to the voluntary preference of his maturer years, when he became *studieux amateur et de Perse et d'Horace*, made him anxious to transfuse the classical graces of regularity and smoothness into the versification of his country. Previous to this period, the French and English poets had been inattentive to rhime and measure, and trusted more to the value of the cargo, than to the beauty of the vehicle. Here, therefore, Boileau perceived an opportunity for the exertion of his talents; and while the wit of Butler was procuring not only pardon, but applause, for slovenly and harsh expression, Boileau was studying the combination of melody with mirth, and exemplifying the precept, which he couches in the following lines:

> *N'Offres rien au lecte[illegible] ce qui peut le plaire;*
> *Ayez pour la cadence [illegible]ille severe—*
> *Le vers le mieux rempli, la plus noble pensée*
> *Ne peut plaire a l'esprit quand l'oreille est-blessée.*

Though Boileau and Butler agree in the application of mock-heroic irony to the follies of religionists, the characters of their satire differ as widely as comedy from farce, or as the polished eloquence of a legitimate pulpit, from the vigorous and impressive, but endless and unequal harangue of the conventicle. Butler overlays us with an accumulation of wit, and fatigues us with the learning by which he increases its ludicrous effect. Boileau, inferior in both, accommodates them with more address to ordinary readers, and calculates more correctly, from the nature of the mind, the period when attention must flag, and risibility languish from excess. He also verifies the remark of Johnson, that "the learning of the French is, like their food, not the best, but they know how to cook it." In Butler, we are surfeited with substantial, but inelegant, profusion; while Boileau, by the rapidity and lightness of the repast, prevents any decay of appetite till it is finished. Of all the British poets, Pope has been most frequently compared with Boileau. There seems to have been a natural resemblance in their minds; and Pope was enabled by the priority of Boileau, as Boileau by that of Horace, to transfuse into his writings more of it than might otherwise have appeared. In the works of both we find the same bias to ethical severity; the same abundance of pointed and proverbial couplets; the same felicity in complimentary or reprehensory criticism; the same classical correctness of design; and the same copious mellifluence of numbers. It must be allowed, however, that Pope possessed a greater variety of talents than Boileau; for we doubt if the latter was capable of producing any thing so pathetic as the "Epistle of Eloisa," or so original as the fanciful machinery of the Sylphs; and in lyric poetry Boileau sinks farther beneath Pope, than Pope beneath Dryden. The "Rape of the Lock" and the "Lutrin" have been always considered by critics as poems of the same class, though the latter, perhaps from its subject, appears to shade at times into the coarser manner of the Dunciad. The follies of fashionable life admitted of a light and smiling airiness of ridicule, which would not have harmonized with the rebuke of ignorance, gluttony, and sloth. Between the two poems, however, there is an obvious likeness, from parity of conception and felicity of execution; from the wit which sparkles in the parts, and the seasoning of humour which enriches the whole.[*] In humour we, indeed, consider them as nearly equal; but on comparing their wit, we apprehend the balance will incline to our countryman. Our limits not permitting the enlargement of these remarks, we shall close them with the literary character of Boileau, which was drawn by Voltaire with his usual discrimination. *Incapable peut-etre du sublime qui eleve l'ame, et du sentiment qui l'attendrit, mais fait pour eclairer ceux a qui la nature accorda l'un et l'autre, laborieux, severe, precis pur, harmonieux, il devint, enfin, le poete de la raison.* (w)

BOILING. See CHEMISTRY.

BOIS, DU, or Lake of the Woods, a lake in North America, situated to the north-west of Lake Superior, and to the south of Winnipeg lake. This lake, which is nearly round, has a cluster of islands in the middle of it, so large, that by those who sail past them, they have been taken for the main land. Large quantities of oak, pine, fir, spruce, &c. grow upon its banks, and from this circumstance it derives its name. It stretches about 70 miles from east to west; and, in some parts, it is about 40 miles wide. See Mackenzie's *Voyage from Montreal through the Continent of North America*, Introd. p. 59. (*j*)

BOIS-LE-DUC, SILVA DUCIS, or the DUKE'S WOOD, called also *Hertogenborch*, which has the same meaning, is the capital of Dutch Brabant, and is situated at the confluence of the Dommel and the Aa, in a low, sandy, but cultivated tract, almost surrounded by a morass. This city was built in 11[illegible], by Godfrey III., duke of Brabant, who had been accustomed to resort to that quarter for the pleasures of the chace. The town is of a triangular form, and above three miles in circumference. It has four gates, one towards Breda, called Vucherpoorte; another towards Grave and Nimeguen, called Hintemmpoorte; a third towards Bommel and Utrecht, called Orterpoorte; and a fourth towards Heusden, called St John's gate. It is defended by a castle, called Papen Briel; by the fort of Crevecœur, near the Meuse; the large fort of Isabella; and a small fort towards Brabant, called St Antoine. The town is regularly fortified, and its walls are flanked by seven bastions. The approaches to it by land are on causeways, and by water at three gates, called the Grand Hekel, the Petit Hekel, and the Boom. The cathedral, built in 1366, is one of the finest edifices in the Low Countries. Its wooden tower, which was so lofty as to be seen all the way from Antwerp, was supported by four stone pillars, but was destroyed by lightning in 1584. There were formerly other four churches, but three of them are now used as warehouses. When this town belonged to the Catholics, it contained 16 monasteries. The monastery of the Jesuits is now the governor's palace. There is likewise in this city a college, and a town hall which is an exact miniature of that of Amsterdam. There are here 51 stone bridges, and 8 made of wood. The adjacent country can be easily laid under water, and sometimes in winter the town can be approached only in boats. The principal manufactures of Bois-le-Duc are linen cloths, needles, knives, and several articles of iron manufacture. Population 9600. East Long. 4° 59', North Lat. 51° 40'. (Q)

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[*] Between wit and humour we take the distinction of Mr Jackson, whose precise words, however, we do not recollect. Wit he represents as a sort of intellectual legerdemain, by which we are led to expect one idea, and surprised by the dexterous substitution of another, as a juggler leads us to expect an egg, and discovers an orange. A juggler is a wit in things; a wit is a juggler in ideas, and a punster in words. Humour again, without these sudden changes, produces its effect by pretending a disposition contrary to what the subject naturally creates, as by censuring with praise, and praising with censure, or by treating a light subject gravely, and a grave subject lightly.

BOKHARA. See BUCHARIA.

BOLABOLA, or BORABORA, one of the Society Isles, in the Southern Pacific Ocean, discovered by Captain Cook in July 1769. It is about seven leagues in circumference, and is surrounded with a reef, nearly full of productive and populous islets. As its shores are rough and precipitous, it has only one harbour. A lofty double peaked mountain rises in the centre of the island. This mountain is barren on the east side, but has bushes and trees on its craggy parts. The lower grounds towards the sea are covered with cocoa, palms, and bread fruit trees. It is said that the first inhabitants of Bolabola were malefactors banished from the neighbouring isles, that the fame of their military talents increased with their numbers, and that they gradually extended their conquests over the other islands. West Long. 151° 52', North Lat. 16° 32' 30". See *Missionary Voyage*, Introd. p. 41. (*j*)

BOLCA, MOUNT. About eighteen or twenty miles north-east of the city of Verona, there is a small village called Bolca, from which a mount, or hill, receives the same appellation. The village itself is not of sufficient consequence to merit a particular description, but it is otherwise with the hill, for in its substance are contained some of the most remarkable natural productions which the world affords.

Around Mount Bolca, and throughout the territory of Verona, unequivocal volcanic remains demonstrate the prevalence of subterraneous eruptions, and also that the whole must have once been covered by the sea. Numerous petrifactions of plants, shells, and marine animals, are dispersed in the earth, but frequently in such an arrangement, that beds in one district are confined to certain species unmixed with others, while the same peculiarity is observed in districts more remote. In the mountains, whereof Bolca is one, there have been found 27 genera of Testacea, hitherto unknown; and not less than 200 species of petrified shells have been dug from the tufa, marbles, and basalts, of which the neighbouring territory is composed. By a wonderful accumulation, shells, whose animals inhabited different seas and different climates, are collected together in the same heap, along with those which never retreat to water. There are also many petrifactions of zoophytes, consisting of the articulations of asteriæ, clusters of corals, and madrepores; and in this unaccountable aggregate, the parts of terrestrial quadrupeds, of birds, and of insects, are not wanting. The bones of huge elephants, stags, and bears, and likewise those of an intermediate tribe, the phocæ, have been discovered. Basaltic columns of various kinds are seen on Mount Bolca, and in the neighbourhood, differing not only in structure, but in the proportions of their elementary parts. Their figure is hexagonal, pentagonal, quadrangular, and even triangular; and their position is generally perpendicular to the horizon; but at San Giovanni d'Ilarione they exhibit a degree of obliquity, as if some disturbing cause had altered their position. Burnt earth, scoriæ, lava, and other volcanic productions, are scattered about the Purga di Bolca; and the hill itself, barren of vegetation, is covered with earth intermixed with animal and vegetable remains. These circumstances, added to the natural phenomena which will come under our consideration, plainly shew, that the tract environing Mount Bolca has been subject to volcanic eruptions, and that the sea has covered it at some very remote period. At present, the nearest shore is fully fifty miles distant from its base.

Bolca.

Part of what passes by the general name of Mount Bolca, is situated at a short distance from the real hill, and called Lastrara; so that, according to the strictest topography, they should be separated: but no such division being spoken of when those who precede us treat of the productions of the place, we shall follow their example, in considering Bolca and Lastrara as synonymous.

All the fossils of the Veronese territory are inconsiderable when compared with innumerable petrified fishes found in Bolca, where it would seem as if the whole seas and rivers of the globe had concurred in depositing their contents. Those of Europe, Asia, Africa, and America, are huddled together in one confused heap: the fishes of the torrid zone are mixed with those of temperate climates; those of fresh water rivers with those of the most extensive seas; and all differing in habits, structure, and properties. Large masses of stone, detached and unconnected with the ordinary substance of Mount Bolca, lie imbedded in the side of the hill, 1000 feet above the level of the sea. Quarries penetrating into these, have exposed the fossil fish to view. The stone containing them is calcareous, of a schistose structure, and susceptible of being split into flags, or laminæ, of various thickness and dimensions; and it has been denominated by mineralogists a marl or marley schist. It is of a whitish, yellowish colour, or of a bluish grey, and some of it is quite black. Its hardness, though of different degrees, is such as commonly to yield to the knife, but not to the nail; and it has one characteristic peculiarity, which consists in emitting a peculiar fetid odour on being struck, or rubbed, compared to that of swine-stone. This odour, the Abbé Fortis, in treating of petrified shells found not far from Bolca, supposes to proceed from animal putrefaction. On splitting the flags asunder, the remains of petrified fishes appear of a dark brown colour, and are consequently very conspicuous on the light ground of the stone. They lie flat between the laminæ; their contour and component parts being little, if at all, distorted from their natural shape and dimensions; but sometimes there is an enlargement or defect, arising either from the changes undergone in passing from an animal to a fossil state, or by the stone apparently having been affected by motion after they were inclosed within it. Their whole form is completely defined, and the harder parts, such as the head, fins, spine, and other bones, are still more evident. The dark brown substance composing the fish remains quite distinct, and projects from the leaves of the stone, in proportion to the size of each part in its natural state, and it may be separated from the stone. It is hard, brittle, and rather glossy, excepting some of the larger bones, such as the joints of the vertebræ, which, though presenting the same external appearance, exhibit cavities filled with beautiful crystals. The different colour of the slate, or flag, inclosing the fishes, has been ascribed by naturalists to the chemical effects of their bodies on the stone, which is not improbable, on reflecting that it could not be originally in an indurated state. Fossil fish are found in various parts of the world, and high above the present level of the sea, but no where in the same abundance as in the quarries of Mount Bolca; and the fishes of this hill are further distinguished from the impressions usually seen in argillaceous schistus, as well as from the petrifactions of shells found in limestone strata. In the latter nothing more than the simple impression of the fish remains, and the external shape of the shell is alone preserved, whereas, in the productions of Bolca, the form and size of the animals are not only admirably exhibited, but there even seems to be the residue of animal matter, in that substance which we have said may be detached from the stone. Inspection determines it to be of a different nature from that of the inclosing stone, and, so far as could be judged without analysis, those naturalists who have bestowed most attention on the subject, conclude it to be animal remains; and that it is in a condition similar to the flesh of mummies; from which circumstance Volta denominates the state of these fishes *natural embalming*.

Most of the fishes of Bolca are such as now inhabit the European seas, but there are some species peculiar to the rivers of India and America exclusively, while there are many belonging to the fresh water streams of our own and neighbouring countries. It is asserted by observers, that petrified American fishes are found in no other part of Europe, notwithstanding there are numerous impressions of European ones in France, Switzerland, Germany, Britain, and elsewhere.

Of many hundred specimens dug from the quarries of Bolca, the species amount to 94; the rarity or abundance of which is extremely diversified, as well as the size of each. Some have been found three feet in length; and, in 1789, the *pegasus natans*, a small fish, was dug out of Lastrara, which, from its minuteness, almost escaped notice. Thus the natural agent affecting their transition from the animal to the fossil state, has equally operated on the bodies of all. A young shark, now preserved in a cabinet, merits particular observation. It is only 25 inches in length, wanting a small portion of the tail, and four in breadth; and more perfect than any of the same genus found in Bolca, though the remains of sharks of much larger size have been procured. The ravenous nature of the animal is disclosed by the contents of its stomach, which exhibits a quantity of sea crabs; but it is wonderful to remark, that these are in a half digested state. Considering the voracity of such fishes, it is evident that death must very soon have followed the capture of the prey. Certain appearances denote incipient putrefaction, which plainly proves, that the commencement of the transition to the fossil state must have speedily arrested its progress. The sudden change which ensued is further corroborated by the skeletons of two fishes imprinted on the same stone; one of which has seized the head of the other, and seems in the act of swallowing it. This is esteemed one of the most singular productions afforded by Bolca. The genus chætodon has more frequently been described than others, either from readily occurring, or from being better adapted for preservation. Scheuchzer long ago observed, that the *chætodon pinnatus*, a fish commonly inhabiting the Arabian and Indian seas, was dug out of Bolca; and more modern European naturalists, on comparing the fossil with the real animal, ascertain, that, in the transition undergone, some parts have either enlarged or become defective. The *chætodon mesoleucus*, lately transmitted from Japan, and which still lives in the seas of Africa also, is found entire in Bolca. This fish, which is neither mentioned by Artedi nor Linnæus in its living state, was first discovered by Forskhal on the shores of Arabia; and Bloch afterwards received it from the island of Japan. Gmelin, however, in his edition of the *Systema Naturæ*, probably being influenced by the remoteness of these two regions from each other, has formed two species, which seem to constitute none but one. The fossil extracted from the quarries of Bolca corresponds with both. Among the finest specimens procured, is the *chætodon argus*, bearing a minute and perfect resemblance to that caught in the rivers of India, or in stagnant lakes, where it feeds on insects, and animal substances supplied to it. The chætodon argus is conjectured to pass through extensive seas, for it has been described as inhabiting places many degrees asunder. So far as hitherto ascertained, the *chætodon arcuatus* has never been seen in the European seas, yet it is dug out of Bolca. Marcgrave enumerates it among the fishes of Brazil, and Artedi classes it with those inhabiting India. Two specimens from the hill, which are still preserved, first proved it to have anciently existed in Europe. There is a fish of uncommon structure, called the *sea bat* by the older ichthyologists, and thence *chætodon vespertilio* by the moderns, which very few have described. Willoughby speaks of it, but it was unknown to Linnæus, and seems to be found solely in the seas surrounding the island of Japan. One individual, of small size, has come under the inspection of a celebrated naturalist; but another, considerably larger, though in a fossil state, has been taken from the excavations of Bolca. The latter is ten inches in length, from head to tail, and nineteen and a half in extreme breadth: Several of the pectoral and ventral fins are defective, but their origin is still quite conspicuous. Two other specimens of the same fish are likewise extant. A species of ray, which is scarce to be recognised in the European seas, was found in the immediate vicinity of Bolca, along with three univalve fossil shells imbedded in the same stone. It is twenty-three inches long, and nine broad, and narrowly resembles a new species inhabiting Arabia, called *raja sephen*; some are discovered three or four times as large. The fishes of Mount Bolca are by no means confined to genera and species now extant; for various specimens have appeared hitherto undescribed, and which are still unknown. The *uranoscopus rastrum*, so named in its fossil state, has never been seen as a living animal; and the most careful comparisons of all the specimens found, remove it from any analogous species. We shall dwell no longer on this division of the natural products of Bolca; catalogues of which have been published in Italy, shewing what species belong to the seas of the four quarters of the globe, and what are exotic fresh water fishes. Besides these, several rare species of fossil crabs are obtained from the quarries, such as the *longimanus*, *setifer*, and *locusta*, of which the specimens are particularly fine. Among the insect tribes, there have been dug up an *oniscus*, *oëstrus*, two *asili*, and an American *cimex*. Complete exuviæ of marine serpents are sometimes, though rarely, laid open; and numbers of marine plants are imprinted on the stones. The parts of birds are less frequent in a fossil state than those of any animals; but a petrified quill was once found in Bolca, and lately preserved at Verona, as an exception from the general rules of nature in accomplishing this extraordinary transition.

A profound and interesting problem arises on the formation of this singular hill, and the substances which it contains. First, How can such an aggregate of animals, inhabiting regions so many geographical degrees asunder, have been collected in so limited a space? Secondly, How are the fishes inhabiting salt and fresh waters respectively, which may almost be denominated different elements, intermixed? And, thirdly, How have the bodies of such soft and destructible animals been able to resist the usual decomposition of nature, undergo a transition to stone, and remain entire from a period of such remote antiquity? Various theories may be offered on these questions, which, in this place, we shall not pretend to discuss, as they will partly come under our consideration in other articles. But there are some points which peculiarly relate to Mount Bolca itself, on which we shall make a few observations.

It is evident that the sea has once overflowed the highest mountains. Beds of shells, and strata of calcareous substances, added to the impression of fishes on stone, besides many other concurring circumstances, prove the truth of this assertion. It is clear, therefore, that the Veronese territory, which presents all these indications in the most conspicuous manner, may have anciently been submerged, or even may have been the bottom of the sea. In various portions of the globe the waters have receded; and we know, that, in certain places, their gradual retreat has been slowly exhibited in successive ages. At the same time, it is not improbable that they may here have at once been withdrawn by some violent convulsion of the earth; a fact which has been exemplified in the course of the preceding centuries. But supposing that they naturally covered the Veronese territory, it is far from easy to account for the diversity of fishes belonging to remote climates being found in the same spot, especially as the heat of the torrid zone seems indispensible to their existence. Yet, without recurring to the gradual refrigeration of the earth, or the gradual change of climate in limited districts, which we are well assured has followed, two circumstances ought to be preserved in view: Nothing can be more imperfect than our acquaintance with the finny tribes. Genera and species innumerable have never met the eye of mankind; and it is justly remarked by a modern ichthyologist, that our principal knowledge of their distinguishing characters have first been derived from those served up at our repasts. Can we affirm with confidence, that any fish of the Mediterranean is unknown in the Pacific Ocean, or that many in the Greenland Seas do not frequent the shores of Britain? Skilful naturalists are aware, that animals are daily discovered in one region, that have been referred to and described as peculiar to another; and that, with care and attention, even when removed from their original liberty, they may be preserved and propagated in climates not naturally their own. Neither can we overlook an important fact, relative to the temperature of the elements, which terrestrial and aquatic animals respectively inhabit. The air is subject to constant vicissitudes from external causes, but it is probable that the temperature of a vast body of water always continues at nearly the same degree; nay, it is probable, that, with the exception of extreme cases, the temperature of the sea, above fifty fathoms deep, is not very different all over the world. Hence it is possible, supposing the genera of Mount Bolca and those of the Indian Seas to be identified beyond dispute, that both may have enjoyed a requisite degree of temperature when a deep sea covered the territory of Verona. Fishes, however, are more privileged than terrestrial animals, in the facilities of seeking a temperature agreeable to themselves; if the surface of their element undergoes refrigeration, they have only to plunge farther into its depths; and the body being too immense to be susceptible of sudden vicissitudes, they have time to withdraw from one parallel of latitude to another, as their sensations may require. We know, that certain fishes can support a considerable change of climate without injury; and that some, transported north from places far to the southward, have been naturalized.* Thus, we cannot with absolute confidence maintain, that the fishes hitherto thought peculiar to the warmer climates could not live in the seas covering Mount Bolca, or that they did not enjoy that degree of temperature

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which was necessary to their nature. Perhaps those seas may have been heated by the effects of the volcanoes, whose remains are scattered over the territory; for although great bodies of water cannot be suddenly affected by a change of temperature, the shallows immediately surrounding volcanic mountains and isles have been known to melt the pitch of vessels sailing close by their sides. Such shallows are always a grateful abode to fishes: there they flock together in numbers, and perhaps find more copious supplies of food in the marine insects which the heat conspires to propagate and diffuse. The atmosphere is likewise greatly heated by the fires of constant volcanoes; and it has been affirmed, that one of the most productive islands in the globe is rendered so, principally by the constant flames of eight volcanoes. In this way, the temperature of the Veronese territory may have anciently been augmented. It is infinitely more difficult to explain how salt and fresh water fishes are intermixed; for although it be very possible, that, by gradual and almost imperceptible transitions, they might be reciprocally brought to live in either; or successive generations, by passing from greater or lesser degrees of saltness or freshnes while in the ovular state, might habituate the perfect animal to the change; as we have not witnessed the fact, we cannot maintain that it has taken place. Still it is to be remembered, that some fishes dwell in salt or fresh water indiscriminately; that we do not know whether confinement to one of them only is destructive; and that there is a minute resemblance between the species of the same genera which inhabit both.

The presence of the sea, however, on the Veronese territory, is not indispensible to the existence of the fishes of Bolca. A volcano on the surface of the earth may have been the sole agent. Some philosophers affirm, that all volcanoes have a communication with the sea by subterraneous caverns. Mount Vesuvius vomited quantities of water in 1538, and in later times: and Ætna, in 1755, cast up salt water, mixed with stones and sand. But we have still more decisive proof, how essential volcanic agency might be in producing the fishes of Bolca, from learning that vast quantities of a species of small fishes have been discharged from the burning craters of mountains in South America; sometimes in such extraordinary numbers, that their putrefying bodies threatened to create a pestilence in the land. Volcanic eruptions in the vicinity of the sea, or of lakes, are commonly fatal to vast multitudes of fishes; on which account, those which issued from the Peruvian mountains might have perished before being absorbed by the craters. Pliny, in describing the fatal catastrophe wherein his uncle perished, remarks, that the sea suddenly ebbed during the eruptions of Vesuvius, and many animals remained dry on the sand: and centuries afterwards, a similar phenomenon allowed the inhabitants of the neighbourhood to collect the fishes lying dead on the shore. During the rise of new islands from the sea of the Greek Archipelago, dead fishes continued to be thrown up during a whole month on the sand: and an instance, still more noted, was seen in 1742, at the port of Vera Cruz in Mexico. A sudden agitation of the sea on the 19th of October, threw down part of the wall of the city, and threatened the vessels in the harbour with destruction. Next day incredible quantities of fishes covered the beach, lying in heaps on each other; and consisting of many species altogether unknown to the fishermen: nor were they confined to the vicinity of the port, as the same appeared at the distance of leagues from it. The heaps were so great, that, to avert the danger of putrefaction infecting the atmosphere, all the slaves of the place, and the crews of the royal gallies, were employed in burying them in the places where they lay. The like phenomenon was renewed in the island of Sumatra, in the year 1755, when an amazing multitude and variety of fishes, some dead, others dying, were found on the shore. We are, therefore, entitled to maintain, that fishes may be vomited from the crater of a volcano; and to conclude that volcanic eruptions are sometimes singularly destructive of those in the surrounding seas. Different theories are entertained respecting the cause of their death. Some naturalists conceive that a mephitic vapour is suddenly diffused throughout the water, which immediately becomes fatal to the animals within its sphere; that they are involved in showers of volcanic ashes, which then become the deposit of their bodies, and the source, as in the case before us, of their future preservation. The fishes of Bolca have unquestionably perished by sudden death, as is demonstrated by the half digested food in the stomachs of some of the most voracious. Those who oppose the deposit being formed at the bottom of the sea, maintain, that the fishes, once exposed on a dry shore, might easily be covered and invested by showers of ashes, which, while forming a crust around them, would aid the absorption and evaporation of the water; and that their gradual accession is particularly favourable to preserving the figure of the animals enclosed, from the superincumbent weight not being sufficient to crush them. As the strata of Bolca, along with fishes, contain the leaves of trees, terrestrial plants, fruits, and flowers, and even some winged animals, this hill could not be at the bottom of the sea when the deposit was formed, because the lightness of leaves always buoys them up on the water. Volcanic showers also are heavy enough to break them off the trees, and are even capable of killing birds; and that peculiar odour emitted by the flags is improperly referred to an animal principle, for it should rather be called bitumenous. The ashes discharged in forming the new islands of the Archipelago were mixed with much bitumen, which served as a gluten to bind them together, consolidate them, and involve the substances which they covered. Those from an eruption of Vesuvius in 1737, spread over the gulf of Venice, and at Zannichelli diffused a similar odour, which assuredly, say the partizans of this doctrine, could not be imparted by putrefying fishes. "Volcanic showers," in the words of Domenico Testa, "having fallen on Bolca, destroyed and burned together, the fishes of the sea, the birds of the air, the trees, and plants of the earth. Thus did an eruption form that celebrated cemetery of fishes, which for two centuries has equally been the admi-friction on every part of the stone, is considered a strong presumption also, that its whole substance has absorbed a great proportion of animal matter.

Admitting the truth of the general principle, on which these theories are founded, there are still many difficulties to be surmounted, and one of the most important lies in the structure of Bolca. This hill is not a homogeneous mass; it consists of various substances, in unequal proportion, and forming four classes, according to geologists, among which are marl, spar, basalt; coal and amber; pyrites and hæmatites; marine plants, insects, fishes, and the remains of terrestrial animals in a state of petrifaction. The petrified substances do not lie in horizontal strata; horizontal so far as would result from the deposit of pulverised matter on an uneven surface; for the masses of stone wherein they are contained are imbedded in the sides of the hill: they seem detached and apart from the other parts composing it, and rest in various degrees of inclination. But perhaps this may be accounted for, by supposing, that subsequent to their formation, they were exposed to some violent disturbing cause, which affected their original position. There is no necessity that such disturbing cause should have approached the æra of their formation; on the contrary, appearances indicate that it has existed at a time very remote from it. If the fishes were suddenly destroyed by some pernicious vapour, absorbed by the water where they swam, or by some lethal quality otherwise imparted to it, they must have remained for ages in their original state. The open mouth and distended fins exhibited by them, naturalists have conjectured denote immediate suffocation; after which they were involved by the component matter of the stones containing them, and themselves converted to stone. But that the deposit was made on a surface at rest, is evinced by the laminar structure of all the strata; their whole leaves are parallel to each other, and perfectly flat; where their continuity is interrupted, the extremities are sharp and cleanly cut off, as if by fracture in their horizontal position. Though the time requisite for complete petrifaction is unknown, we may presume that it is slowly accomplished; and if we are to credit the correctness of an observation, that in 1500 years wood was not affected above a quarter of an inch in depth, the period must almost exceed the bounds of calculation. Therefore it is not unlikely that two great epochs are to be counted in the formation of Mount Bolca and its singular fossils: first, that which occasioned the sudden destruction of an infinity of living beings, and their undisturbed envelopement and investiture at the bottom of the sea, by the substance diffused; and secondly, the disturbance of that deposit from its original level, which may probably have been accomplished by some violent convulsion of the earth. But the one may have followed the other at an immense interval of time. Had it happened soon after the animals in question perished, their tender and corruptible substance would have soon been so essentially altered, as to preclude all possibility of recognising them at the present day. Surely we need not anticipate objections from the force required to implant the huge calcareous masses in the sides of Bolca. If rocks are projected from burning craters, mountains raised, or islands formed in unfathomable seas, what power is there which violent convulsions of the earth are unable to overcome?

The curiosities afforded by Bolca, had, centuries ago, attracted the notice of ingenious and speculative minds; and thence the peasantry and labourers of the neighbourhood have gained a livelihood by procuring them. Blocks of moderate size are detached from the face of the quarries; and being brought out and set on edge, are split asunder with sharp hammers or wedges. The workmen then examine the leaves, to discover whether there be organic remains of fishes or other substances; and should they discover any such, which are generally shattered from the rudeness of the operation, they collect them with the greatest care: the pieces also that adhere to the stone, are cautiously separated from it. When their daily occupation is completed, the workmen carry the collections they have made to their own houses, where they are kept until delivered to their employers in Verona. The pieces are taken thither in baskets, and either given to the owner of the soil, or privately sold to dealers in such productions, or to naturalists desirous of acquiring them. It is said that the purchaser, who obtains the fossils in this state from the workmen, is then obliged to employ a skilful lapidary to search out and arrange the pieces composing each specimen, and cement them on another stone of the same kind. So much art and accuracy are sometimes used in doing this, that it is scarcely possible to discover the places of junction; and it is thus that the specimens are prepared for sale, or for cabinets. As a greater or less proportion of the brown matter of the bones, fins, and other parts of fishes, sometimes adhere to one side in splitting the stone, and sometimes to another, or is frequently divided between both, the more valuable specimens consist of duplicates; for when the pieces are well and skilfully put together, their prominences correspond with the cavities in the opposite half. Most of the specimens hitherto extracted have come from one principal quarry in the side of the hill, called *Pescaia* by the inhabitants of that territory; but there are several besides, supposed to be of later discovery, all equally abounding in petrifactions. The people, however, who attempted to form excavations being poor, and no funds being specially appropriated for this curious research, which would have been attended with considerable expense, nothing important followed. The soil where the quarries lie, has belonged to different owners, who were solicitous to obtain its contents.

The variety and singularity of the fossils discovered on the surface and in the recesses of this hill, afford so much scope for philosophical contemplation, that unusual care has been taken to collect and preserve them. Extensive cabinets, from which all other varieties were excluded, have thence been formed of them alone; and these have passed into the hands of successive owners, along with a right to explore the soil, in the same manner as we are wont to transfer the richest territorial property. The first cabinet of the productions of Bolca with which we are acquainted, was collected by a person distinguished in the pharmaceutical art, Francesco Calceolari, who flourished in the sixteenth century. He is celebrated by Aldrovandus, Gesner, and other cotemporary authors, for his knowledge of natural history; and left a work on the contents of his cabinet, *Descrizione de Museo Calceolari*, which was published after his decease by *Andrea Chiocco*. Nearly a century later, Count Ludovico Moscardi, having the same propensities for study, formed a cabinet, partly consisting of the petrifactions of Bolca. Still more recently, a member of the noble family of Rotari and Count Andrea Gazola, were occupied with similar pursuits towards the earlier part of the 18th century. The former, who died in 1744, addressed a learned epistle to Vallisnieri, on the subject of the fishes of Bolca; and the latter laid the foundation of the most celebrated of all collections of this description, which still subsists in his nephew's possession. Soon afterwards, the learned Marquis Scipio Maffei, equally distinguished by his skill in polite and antiquarian literature, as in exploring natural phenomena, purchased the quarries. Assisted by M. Seguier, a French botanist, he was long engaged in recovering the fossil remains of animals, numerous specimens of which were dispersed among the naturalists of Europe. Nearly about the same time, Giacomo Spada, a priest of Grezzana, which is a place situated among the Veronese mountains, following in the footsteps of Maffei, soon formed a respectable collection, which constantly increased during his life. When he died, in 1750, it passed into the hands of Maffei, from whom M. Seguier acquired it; and by him it was carried to the city of Nismes in France, where it yet remains. Spada published three different works on the petrifactions and fishes of the territory of Verona. The loss of his museum, and of the collections of Maffei to that country, were partly indemnified by Julius Cæsar Moreni, whose cabinet was enriched with numerous petrifactions, but particularly fishes. The whole was on his death acquired by the Marquis Ottavio di Canossa. Near to the period when the labours of Moreni ceased, those of the most celebrated of all the collectors, Vincenzo Bozza, a learned apothecary of Verona, commenced. Twenty years were occupied in forming his museum, which neither expence nor trouble were spared in rendering complete. He purchased the soil wherein the quarries of Bolca lie, or obtained permission from the heirs of Maffei to renew the excavations; and, towards the year 1770, began to found a collection, from its owner denominated *Gabinetto Bozziano*, which was famed over all Europe. The activity of Bozza was not less excited by his love of investigating the profound phenomena which his researches tended to elucidate, than by the desire of surpassing those cotemporaries who were engaged in the like pursuits. At length his cabinet contained 700 specimens of petrified fishes, besides many other animal and vegetable substances, recovered in the same state from the territory of Verona. Amidst such a number of specimens, 69 different species of fishes could be distinctly identified, setting aside others whose characteristics were not sufficiently prominent to give them an appropriate place in the arrangement. "In my cabinet," says Bozza, "which contains above 600 fishes of different sizes, all extracted from Bolca, there are more than 100 whose kinds are known, which differ from each other in genera and species; and many others besides to which similar ones have not yet been discovered alive." Juan Andres, a Spanish traveller, relates, that Bozza assured him, that he possessed eight species of fishes such as now inhabit the Pacific Ocean, and above 30 other species totally unknown; and he saw some specimens 30 or 40 inches in length. But the Physical Society of Verona, on stricter scrutiny, have reduced the species to 69. In the year 1794, this magnificent collection was purchased, at a high price, by the Count Giambattista Gazola, nephew to Count Andrea, mentioned above. The Count had himself with great industry procured fossil fishes during the space of eight years, and his museum contained many specimens not to be found in that of Bozza. He likewise acquired the museum of another collector, the Marquis Giacopo Donisi; so that he came into possession of the most splendid and extensive collections which any naturalist had ever enjoyed. From Mount Bolca alone he had above 800 specimens of petrified fishes, many of extraordinary size, and of the finest quality; and the same place afforded him numerous petrifactions of crabs, winged insects, and marine plants, of which he was enabled to form a perfect series. See Societas Physicorum Veronensium, *Ittiolitologia Veronese del Museo Bozziano*, 1796. Bozza *Lettera al P. Orazio Rota, sulla universale rivoluzione sofferto dal globo terracqueo.* Ermengildo Pini *sulle rivoluzioni del globo terrestre provenienti dall' azione dell' acque*, part i. ii. Spada, *Dissertazione ova si prova che li Petrificate Corpi Marini che nei monti adiacenti a Verona si trovano, non sono scherzi di natura, ne diluviani ma antediluviani.* Spada, *Corporum lapidefactorum agri Veronensis Catalogus.* Testa, *Lettera su i Pesci Fossili del Monte Bolca.* Fortis, *Lettera al Signor Abate Testa sopra i Pesci Ischeletriti de' Monte di Bolca.* Fortis, *Transunto della replica al Signor Abate Testa sugli izzioliti de' Monti Veronesi.* Juan Andres, *Cartas familiares del viage que hizo a varias ciudades de Italia*, v. 3. Maffei, *Verona Illustrata*, tom. iii. *Compendio della Verona Illustrata, ad uso de' Forestieri*, tom. i. *Catologo Sistematico dei piu rari Ittioliti del Monte Bolca, che si conservano nel gabinetto privato del Signor Vincenzo Bozza.* (*c*)

BOLE. See Oryctognosy.

BOLETUS, a genus of plants of the class Cryptogamia, and order Fungi. See Botany. (*w*)

BOLINGBROKE, Lord. See St John.

BOLCHERETSKOI, a town of Kamtchatka, situated in a swampy plain on the banks of the Bolchaia-reka, a river which rises about the middle of the peninsula, and after running northerly about thirty miles, falls into the sea of Ochotsk. The town is placed on an island formed by the arms of this river, which divide the town into three parts. The town consists of several rows of low buildings, thatched and built with logs. Each of these buildings contains of five or six dwellings, connected together with a long common passage, which separates the storehouse and kitchen from the dwelling apartments. The principal buildings are a church, a court room, and barracks for the cossacks and Russian soldiers. The river is about six or eight feet deep, and a quarter of a mile broad below the town. The Russian government once proposed to make this place the depot of their commerce; but the harbour affords no shelter from the winds, and as the navigation of the river is extremely dangerous, this idea was abandoned. Population 600. E. Long. 137°, N. Lat. 53°. (H)

BOLOGNA, BOIONIA, BONONIA, or FELSINA, a city of Italy, formerly the capital of the duchy of Bologna, but now the chief place of the department of Reno, is situated in a beautiful plain at the foot of the Apennines, on the rivers Savona and Reno, the former of which washes its walls, while the latter runs in several branches through the city, and communicates with the Po by means of a canal.

"The ancient name of this city," says Keysler, "was Felsina, from Felsinus, a Tuscan king, who is supposed to have built it twenty-five years before the foundation of Rome.[*] The name of Bononia is by some derived from a successor of Felsina, called Bonus, but others derive it from the Boii."

Bologna, which is of an oblong form, is surrounded with a lofty brick wall, and is about five or six Italian miles in circuit.[†] The streets are narrow, and rather gloomy, from the fronts of the houses being built upon arcades, and the houses are tolerably built. The pillars of these arcades or porticos, are irregular in different houses, some of them being high, others low, some square, and some round, and some of stone, while others are of wood. The streets where the carriages pass are considerably lower than the porticos, like the rows at Chester. The houses are flat roofed, with a parapet towards the streets, and are covered with tiles.

The public buildings of this city are large and elegant, and are equally remarkable for the beauty of their architecture and for their internal decorations. Next to Rome, Bologna contained the most valuable paintings by the first Italian masters; but many of these noble relics have been carried off by the French to adorn their capital; and while we think that we are noticing the curiosities of Bologna, we may unknowingly be describing the statues and pictures of Paris.

The tower of Asinelli, built by Gerardo Asinelli in 1109, stands in the centre of the city. It is 371 feet high, and is the loftiest in Italy, excepting the cupola of St Peter's. The tower, which is square, is ascended by 464 wooden steps, and inclines from the perpendicular about three feet and a half.

Near this tower is the leaning tower of Garisenda, which is 144 feet high, and inclines about eight feet two inches from a vertical line. It was formerly of a much greater height; but the foundation of it having given way, a great part of it fell or was taken down.

One of the finest buildings of Bologna is the Palazzo Publico, in which the vice legate, the gonfaloniere, and other officers of state had their apartments, and in which the courts of justice were held. It stands in the great market place, presenting a front of 218 common paces. A brass statue of Pope Gregory XIII. executed by Minganti, and weighing 11,300 pounds, stands over the entrance; and at the left of the entrance is another statue of Pope Boniface VIII. On the front of the palace are two inscriptions, one commemorating the interview between Charles V. and Clement VII. in 1529, and the other the dreadful pestilence which visited the city in 1650. One of the apartments shewn to strangers, is the Salone D'Ercole, which contains a noble statue of Hercules, of a huge size, executed in *terra cotta* by Lombardi. In another little saloon are represented the principal achievements of the Bolognese, inscribed with Latin verses. Above the Salone D'Ercole is the Sala Farnese, which derives its name from a marble statue of Pope Paul III. who belonged to the Farnese family. At the expense of the Cardinal Farnese, the walls and cieling of this apartment were painted by the best masters of Bologna. The principal paintings are, Francis I. King of France, touching for the evil at Bologna before Pope Leo X.;—the public entry of Paul III. into Bologna;—the aqueduct of Cardinal Alborno; and the coronation of Charles V. The museum of Aldrovandi is also in this palace, consisting of 187 folios, and above 200 bags full of single leaves, written by the hand of that learned naturalist. The cabinet of valuable medals, belonging to the Marquis Cospi, has been added to this collection. The arsenal, containing military stores and artillery, with 6000 stand of arms, are likewise kept in the palace.

Before the palace is an area 370 feet long, and 300 broad, containing a noble marble fountain, which, with the leaden pipes, &c. is said to have cost 70,000 golden crowns. On the top is a statue of Neptune, eleven feet high, supporting a trident. A number of dolphins ejecting water, and four sea nymphs, with streams issuing from each breast, are placed within the bason. The brass statues were executed by Giovanni di Bologna, the rest by Antonio Lupi, and the whole arranged by Lauretti.

In the private palaces at Bologna are many interesting paintings, which our limits will only permit us to enumerate.

In the palace of Bonfiglioli are several beautiful pieces by the Caracci's, and nearly fifty drawings by the first masters, among which are the massacre of the innocents, by Raphael; Veturia and Coriolanus, by Baptista Franco.

The palace of Campeggi, built of freestone, was once the residence of Charles V. In the gardens is a lion of white marble, which was formerly erected at Ravenna by the Venetians.

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[*] The name *Felsina* has been derived from a word in the language of the ancient Gauls, which signifies a hill, and is supposed to have been given to Bologna, from its situation on the western declivity of the Apennines, "Les Gaulois qui occupaient deja la vaste plaine qui borde le Po des deux cotes, appelerent le lieu ou elle est située *Felsina*, qui dans leur langue, comme dans la Teutonique, signifiait colleul ou petite montagne." *Tableau Historique, Statistique et moral de la Haute Italie*, par Ch. Denina, sec. 16. p. 289. Par. 1805.

[†] "Bologna is formed in the similitude of a ship, more long than broad, at one side shewing the figure of a prow, and at the other, that of a poop, having in the midst the most high tower Asinelli, which represents the main mast, the lower Garisenda, the sails, and the other small towers, the shrouds, to the eye of the beholder." *Italy in its Original Glory, Ruin, and Revival*, by Edmund Warcupp, Esq. Lond. 1660.

The palace of Caprara is particularly interesting to travellers. Among the curiosities which it contains are the brass statue of General Caprara, on a pedestal of red porphyry, supported by a Turk. At the corners of a splendid gallery are closets filled with shells and other marine productions; and the other parts of it contain numerous curiosities, and pieces of antiquity, which it would be tedious to enumerate. Among some fine paintings contained in the gallery, is the death of Bragandini, who was flead by the Turks, painted on wood.

The palace of Favi is enriched with the works of the Caraccis. On the ceiling of a saloon, the adventures of Jason are painted in fresco, in eighteen pieces, by the two Caraccis, under the inspection of their uncle Luigi. In another apartment, twelve paintings from the Æneid, are executed in fresco, on the frize, by Luigi Caracci, from which five etchings have been made by Mitelli. The other adventures of Eneas are painted in ten pieces by Albani; and the other disciples of Luigi Caracci have finished the remainder in another apartment.

The palace of Magnani is celebrated by the history of Romulus, painted in fresco by the three Caraccis. The beauty of the colouring is faded.

The palace of Molari contains a number of pieces by Albani and the Caraccis; a gallery painted by young Cignani; the raising of the siege of Turin, by Antonio Casa; and a much admired painting, representing a woman asleep, while a laughing wanton boy is letting down upon her breast a mouse suspended by a thread.

The palace of Pepoli contains several fine paintings on the ceilings. There is here also a silver triumphal car holding two ladies, which moves round the room by clock work, as if it were drawn by two lions.

The splendid palace of Ranucci is adorned with some beautiful tapestry made at the Gobelins; by a painting of Jerome, and another of Joseph flying from Potiphar's wife, by Guido; and the fall of Haman, by Antonio Gionima, in which the figure of Esther has met with great admiration.

The palace of Sampieri possesses several paintings by the Caraccis, and the *chef-d'œuvre* of Albani, which represents Cupid kissing Venus, and pointing with a triumphant air to the rape of Proserpine by Pluto. There is also here a masterpiece of Guido, called the "Repentance of St Peter."

Besides the palaces which we have enumerated, those of Legnani, Marescotta, and Volta, are worthy of being visited.

The churches of Bologna are both numerous and splendid. They are said to amount to 200, most of which contained some of the finest productions of Italy.

Over the great altar in St Anthony's church is an excellent piece by Luigi Caracci, representing the preaching of the primitive hermits. In the Oratory near this church, is the annunciation by Tiarini, which has been greatly admired.

St Bartholomew's church contains an annunciation, the nativity, and the flight into Egypt, by Albani. The three aisles were painted gratuitously by Angelo Michael Colonna, from a motive of devotion. A fine marble statue of St Petronius, by Brunelli, stands before the church.

In the vestry of the church of the capuchins, is a charming crucifixion by Guido Rheni.

The church *ad Corpus Domini* is adorned with a Christ descending into the *limbus patrum*, and the interment of the Virgin Mary, both by Luigi Caracci.

The Cathedral, or *Il Duomo*, which is a modern structure, is elegantly finished both within and without. It contains a great number of monuments, and is peculiarly rich in marble decorations. On the ceiling of the chapter room is a fine painting by Luigi Caracci, representing St Peter on his knees before the Virgin Mary, and in the tribune of the cathedral is the annunciation of the angel Gabriel, the last effort of the genius of the same inimitable artist.

The church of the Dominicans contains, in a magnificent chapel, the monument of St Dominico, who died in 1221, which is of white marble, and adorned with beautiful basso relievos by Michael Angelo. The vestry contains a great quantity of jewels, along with the Old Testament, said to be written by Ezra. Montfaucon, in his *Diarium Italicum*, says, that this MS. is very ancient, and was presented by the Jews at the beginning of the 14th century.

The chapel of Rosario contains the remains of Luigi Caracci; and possesses such a quantity of plate, that it is guarded in the night by several mastiffs, and a centinel well armed.

The Franciscan church is enriched with some highly finished paintings by Luigi Caracci, Facini, Brizio, Guido, and Tiarini.

The church called *Chiesa del Buono Giesu*, is of an oval figure, and is ornamented with paintings in fresco by Pianori. It contains also a fine statue of our Saviour by Brunelli, a marble one of St Apollonia, and one of St Bernardine in terra cotta, both by Lombardi. The basso relievo of the circumcision by Brunelli is above all praise.

The church of St George, contains the nativity of Christ in fresco, by Cignani; the annunciation, by Luigi Caracci; the Virgin Mary, by Annibal Caracci; and the baptism of Christ, by Albani.

The church of St Giovanni Battista de Celestini has a high altar piece, containing a picture of the Virgin with the infant Jesus, which they pretend to say is painted by St Luke.

The church of Giovanni in Monte is in possession of an admirable picture of St Cecilia by Raphael. Entranced with the harmony of a choir of angels, the saint dashes all her musical instruments upon the ground. Though the Count Malvasia censures the stiffness of this piece, it is highly praised by Addison, and is reckoned one of Raphael's masterpieces.

In the church of St Gregory is a fine piece by Luigi Caracci, representing St George relieving St Margaret from the dragon; a picture of St Gregory performing a miracle, by Dionysius Calvert; a baptism of Christ, by Annibal Caracci; and a large picture of St William, by Guercino.

The largest church in Bologna is the church of St Petronius, famous for being the place where Charles V. was crowned in 1530. It is 360 feet long, and 154 feet broad. The pictures of the clergy in hell, of an executioner beheading a saint with a long sword, and of the coronation of Charles V., are deserving of notice. The principal curiosity in this church, however, is the meridian line, drawn by Dominique Cassini in 1653, and renewed in 1695. The line is half the length of the church, and is equal to the 6000th part of the circumference of the globe. It consists of pieces of red and white marble inlaid, about three or four inches broad, and the pieces on which the signs of the zodiac are cut are a foot square. The marbles, which were quite out of repair, were renewed, in 1776, under the direction of M. Zanotti. The gnomon is 83 feet high; a circular image of the sun, about eight inches diameter, being admitted through a round aperture in the roof.

The church of St Salvatore is adorned with many fine paintings by Luigi Caracci, (the assumption of the Virgin Mary, and the picture of our Saviour, are by this artist,) Girolami Carpi, Guido, Benevenuto Tisio, Samachino, and Cavedoni. The perspective pieces, by Mitelli; the marble statue of Christ, by Brunelli; a MS. of the book of Esther; a Hebrew MS. of the Old Testament; and about 300 other MSS. are among the curiosities contained in this church. The building itself is very fine, having three noble chapels on each side.

The university of Bologna is said to have been founded in 433, by the Emperor Theodosius; while others are of opinion, that it owed its origin to Charles the Great. If this monarch had not the merit of being its founder, it was at least greatly indebted to his generosity, and to that of the Emperor Lothario. The first professor of civil law was Ireneri or Irnerio, who was brought here by Lothario. In the time of Andrea and Azzo, the one professor of canon and the other of civil law, it is said that there were no fewer than 10,000 students at the university. The public college, or university, called *Il Studio*, is 213 common paces long, and was built by Barocci of Vignola. Under the word Academy, we have already given a full account of the Institute of Bologna. In this establishment, the principal objects deserving of notice are the astronomical school, containing a model of the Copernican system, the meridian line, cut through a wall a foot thick, under the direction of Manfredi; the observatory; the college library; the school for experimental philosophy; the academy of sculpture; the academy for painting; the anatomical theatre; and the museum, which contains a large collection of antiquities and natural curiosities. These admirable institutions, of which a full account will be found in Keysler's *Travels*, are owing to the liberality of Count Marsigli, one of the generals of Pope Clement XI.; who, being dismissed from the service, went to Bologna to spend his fortune in the patronage of the sciences.

Bologna has given birth to a great number of eminent men, who have distinguished themselves in the various departments of literature and science. Azzo, Odofredus, Campeggi, Paleotti, and Ireneri, were among its distinguished lawyers. Mondini Achillini and Marcello Malpighi, were among its anatomists and physicians. Natural history was under obligations to Aldrovandi and Ferdinand Marsigli; and Peter Crescenzi was the first of the modern Italians who wrote a considerable work on the art of agriculture. The mathematicians and natural philosophers were Ghedini, Manfredi, Zanotti, Beccari, Canterzani, Monti, and Galvani.

A very considerable trade in damasks, sattins, taffeties, silks, and velvets, has been carried on in this city since the year 1341. The silk mills are driven by the river Rheno, which also gives motion to a great quantity of machinery for various other purposes. The crapes and gauzes of Bologna are also in high estimation; the works of the gold beaters is much admired; and its manufactures of paper and playing cards were reckoned very superior. The crapes, gauzes, and cards of Bologna were exported to France and Germany, and its hemp and flax went to Venice, for the manufacture of sails and cordage. Artificial flowers of all kinds are made in great abundance by the nuns; and a great trade is carried on in hams, dried tongues, sausages, maccaroni, olives, perfumes, wash-balls, liqueurs, essences, and leather bottles.

The surrounding country is rich and fertile, and the neighbourhood of Bologna resembles an immense garden. The vineyards are divided by rows of elms and mulberry trees. The melons, olives, and tobacco are particularly celebrated; and the hemp grows to the remarkable height of twelve and thirteen feet, and has been mistaken by travellers for plantations of young ash trees. The trade of Bologna has been much facilitated by the canal which joins the branch of the Rheno that runs through the city, with the lake of Valle di Marara, from which the merchandise of Bologna is sent to Ferrara, and other places situated on the Po.

In the time of the Roman republic, Bologna was but a small town, with two gates; and it is only mentioned in Greek and Latin authors as deriving its name from the nation of the Boii. It would appear from Martial, (*Ep.* lix. lib. 1.) that, under the first emperors, the Bolognese were particularly polished; and we are expressly informed by that author, that one of the most lucrative trades in this place was that of a shoemaker. Though inferior to the surrounding cities, Bologna gradually rose in importance. It acquired celebrity from the interview between Octavius, Anthony, and Lepidus, in an island formed by the Rheno, and from several events during the civil war of these triumvirs. It was not, however, till the 12th and 13th centuries that it became a great and a learned city. It enjoyed a species of independence under the emperors of Germany till the year 1278, when it was given over to Pope Nicholas III. with the exception of some special privileges. The internal discord with which it was agitated, and the wars with neighbouring states, kept it in an unsettled condition, till Julian II., taking advantage of the Venetian war, made himself absolute master of it, expelled the family of the Bentivoglio, and annexed it to the papal dominions. It was stipulated, however, that the Bolognese should have a nuncio at the court of Rome, and an auditor in the Rota; that the town should not be overawed by a citadel; and that the effects of the citizens should not be liable to confiscation. The ecclesiastical affairs were decided by the archbishop, while the civil affairs were under the direction of a cardinal legate from Rome, with a vice legate, and other assistants. The police and revenue of the town were managed by a council of fifty senators, whose president was called the *gonfaloniere*, from his carrying the gonfalone, or standard of the republic. Each senator took this office by turns, and continued in it for two months. His authority, however, was merely nominal, as the cardinal legate influenced every decision.

In the year 1796, after this city was taken by the French, Bologna, Ferrara, Modeno, and Reggio, entered into a treaty to form a republic under the name of *Respublica Cispadona*. Some time afterwards, however, these cities united with Lombardy to form the Cisalpine republic. Bologna now belongs to the kingdom of Italy. Population 70,000. East Long. 11° 21′ 15″, North Lat. 44° 29′ 36″. See *Italy in its original Glory, Ruin, and Revival*, by E. Warcupp, Lond. 1660. Keysler's *Travels*, vol. iii. p. 247—304. Drummond's *Travels*, letter ii. p. 55. Denina's *Tableau Historique Statistique et Moral de la Haute Italie*, sect. xvi. p. 289. Reichard's *Guide des Voyageur en Europe*, tom. i. p. 439. Marquis Angelette's *Notizie dell' Origine e Progressi dell' Instituto delle Scienze, &c.* 1780. *Travels from Paris through Switzerland and Italy, in* 1801 *and* 1802, by a Native of Pennsylvania, in Philips' *Collection*, &c. vol. ix. Stolberg's *Travels*, vol. i. p. 265.; and Moore's *View of Society, &c. in Italy*, vol. i. p. 252. (π)

BOLSENA, a town of Italy, in the ecclesiastical state, situated among wooded mountains, on a lake of the same name. The town itself is poor, and is indebted for any reputation it enjoys to a pretended miracle. It is surrounded with a pretty high wall, flanked with towers, and surrounded with a dry ditch.

The ancient Volsinium, formerly one of the chief cities of Etruria, and said to contain 2000 statues in its temples, squares, and streets, stood on an eminence behind Bolsena, where several antique marbles, basso-relievos, &c. are seen among its ruins. Pliny says that it was destroyed by lightning.

The lake of Bolsena, anciently the *Lacus Volsiniensium*, and the *Lacus Tarquiniensis*, is about 30 miles in circumference, and is surrounded with fruitful hills, with several towns and villages at their base. It is frequented by a variety of water birds. Eels of a prodigious size are caught in it; and it contains a great quantity of fish of different kinds. In this lake are two islands, Martana and Bisentina, or Pressentina. The first is very small, and has only a hermitage, with its chapel, and a few trees on its margin; while the other is adorned with a fine Franciscan convent, and large gardens. It was here that Amalasontha was assassinated by order of Theodatus. Pliny says that these two islands float about with their groves, sometimes assuming a triangular, and sometimes a globular form.[*] Between Bolsena and Redicofani are several fine basaltic columns. East Long. 11° 54′, North Lat. 42° 37′. See Keysler's *Travels*, vol. ii. p. 89. (*o*)

BOLSOVER, a town of England in Derbyshire, is delightfully situated on the declivity of a steep hill, which commands an extensive view. The part of the town which is not upon the hill, is surrounded by a very deep ditch and high bank, which extends about half a mile, and is double at the end of the town next the church. There was formerly a castle here of great strength, situated on the summit of a hill, on the north-west side of the town, which belonged to William Peverel, at the time of the Norman conquest. Leland visited its ruins in the reign of Henry VIII. In 1613, Sir Charles Cavendish erected, on the site of the ancient fortress, a modern house, which still exists under the name of the Old Castle. It is a lofty structure, nine stories high, supported by stone pillars, and the most curious Gothic groins. It is partly furnished, and is the property of the Duke of Portland. Bolsover was formerly celebrated for its manufactures of bridle bits, stirrup irons, spurs, and buckles; but those articles are now chiefly made at Birmingham. The only manufactory in this place is one of tobacco pipes, which are reckoned the best in England. Number of houses 259. Population 1091, in 1801. (H)

BOLTING MILL. See FLOUR MILL.

BOLTON-LE-MOORS, or **BOLTON IN THE MOOR**, an ancient and large manufacturing town of England, in Lancashire. The town, which is well built, is divided by a rivulet into two parts, called Great and Little Bolton. Even in the time of Leland, this town, and many of the villages in its vicinity, were engaged in the manufacture of cottons and coarse woollen goods. The manufacture of fustians, which is still carried on to a considerable extent, was introduced into Bolton at a very early period. Counterpanes, calicoes, muslins, dimitties, and all kinds of articles called Manchester goods, are manufactured here, and are sent to Manchester and Liverpool. Between Bolton and Wigan are found great quantities of cannel coal, of which the turners make snuff boxes, salts, candlesticks, &c. The canal communication with Manchester and Bury has proved of great advantage to the trade of Bolton. The population of Bolton was, in

1773	5,339
1789	11,739
1801	17,416

The number of houses in 1801 was 3386. The number of males 8177, females 9139; of whom 10,066 were returned as engaged in trade and manufactures. The annual returns of Bolton are said to exceed a million sterling. Lime, veins of lead, and calamine, were wrought in this parish, but not with great success. See Aikin's *Description of the Country round Manchester*, 1795. (Q)

BOLTONIA, a genus of plants of the class Syngenesia, and order Polygamia Superflua. See BOTANY. (*w*)

BOLZANO, BOLZAC, or BOTZEN, a town of Bavaria, in the Tyrol, situated on the river Eysak, near its confluence with the Adige. It is a fine thriving town, and carries on a considerable business in banking. It has four annual fairs, which are frequented by merchants from Germany and Italy.

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[*] " Insulæ fluctuantes---in Tarquiniensi Lacu magno Italiæ duæ nemora circumferunt, nunc triquetram figuram edentes, nunc rotundam complexu, ventis impellentibus, quadratum nunquam." Plin. *Hist. Nat.* lib. ii. cap. 95.

The principal foreign merchants who frequent these fairs form a society, which enjoys particular privileges. Those who wish to be enrolled in this association, are proposed by a person of their own religion. They are chosen by ballot, and the votes of two-thirds of those present are necessary for the election of new members. Neither the members of this society, nor their servants, nor their effects, can be arrested within the Austrian States, while going to the fairs or returning from them.

The town was governed by a council, consisting of a deputy, who ought to be a Count, chosen from the higher nobility, three of the order of Knights, and three of the lower nobility, with some burghers and peasants.

In May 1797, Bolzano was taken by the French; but was ceded to Bavaria by the treaty of Presburgh. Since June 1808, it has been the capital of the bailliage of Botzen, in the circle of Eisak. This bailliage contains 21½ square miles, and 43,784 inhabitants. (*w*)

BOMB. See ARTILLERY, GUNNERY, and PROJECTILES.

BOMBAX, a genus of plants, of the class Monadelphia, and order Polyandria. See BOTANY. (*w*)

BOMBAY, an island on the western coast of India, and the seat of one of the English presidencies. It is situated, according to Mr Howe's observations, in 18° 58′ North Lat., and 72° 38′ East Long.; and is about seven miles in length, and twenty-one in circumference.

This island was taken possession of by the Portuguese soon after their arrival in India; and was afterwards ceded, in 1662, to the English, as part of the dowry of the Infanta Catharine, on her marriage with Charles II. Accordingly a squadron under the command of Lord Marlborough was dispatched to India to receive investiture of the island from the hand of the viceroy; and his Lordship arrived at Bombay in September 1663, with Sir Abraham Shipman, as governor, on board. The viceroy was disposed to comply with the instructions of his master, but the powerful opposition of the Catholic clergy, who were unwilling that the island should be delivered into the hands of heretics, terrified him into their measures, and determined him to maintain his station. The obstinate refusal of the viceroy obliged Lord Marlborough to retire with his fleet to Swally road, for refreshments; and, after having laid in a store of necessary provisions, he set sail, in the beginning of 1664, for England, leaving the rest of the squadron under the command of Sir A. Shipman, to spend the remainder of the winter monsoon in some of the nearest ports; and he accordingly remained on the desolate island of Anjadiva from April to October, during which period he buried upwards of 200 of his men. The monsoon being over, Sir Abraham put to sea, and sailed again for Bombay. On his arrival, he threatened the viceroy and the clergy with the vengeance of the kings of England and Portugal, if they continued to refuse obedience to their majesties contract and instructions; and accordingly, they at length agreed to a treaty, by which the inhabitants were to enjoy the free exercise of their religion, and the possession of their estates under the crown of England. But although the trade of Bombay was at this time exceedingly flourishing, yet, as the revenue of the island was not equal to the expence of the establishment, the king, in 1668, made a full grant of it to the East India Company, in whose possession it still remains.

The climate of Bombay is temperate, as, from its insular situation, it enjoys the full advantage of the refreshing breeze, which renders the atmosphere cooler than in many parts of the continent of India. The rains last about four months, and continue with little interruption from about the end of May to the beginning of October. The following Table shews the quantity of rain which fell during this period, in the course of one season:

	Inches.	Tenths.
May,	1	0
June,	44	7
July,	29	9
August,	19	0
September,	11	2
October,	4	5
Total,	110	3

This island was formerly reckoned exceedingly unhealthy, insomuch that it was considered as the grave of the English; but it is now rendered much more salubrious, by the building of a wall to prevent the encroachment of the sea, where it formed a salt marsh; by draining the marshes in its environs; and by an order that the natives should not manure their cocoa nut groves with putrid fish. Nevertheless, many Europeans, especially on their first arrival, are attacked by the diseases common in warm climates; but this, in many cases, is owing to the irregularity of their mode of life.

The soil of Bombay is sterile, and incapable of any material improvement. The vegetable productions of this island are, consequently, very insignificant, consisting chiefly of cocoa nut groves, rice, and some other Indian fruits. However, not a spot of it remains uncultivated; so that although it is far from producing a proportion of food adequate to the consumption of the inhabitants, yet, notwithstanding the disadvantages of its soil and situation, the produce is very considerable.

The city of Bombay is about a mile in length, and is defended, both towards the land and sea, by various fortifications, the construction of which has cost an immense expence. The houses are, in general, neither splendid nor commodious: they are commonly only ground floored; but are not flat roofed, as in the other parts of the East, being covered with tiles in the European fashion. The English have glass windows; but the other inhabitants form their windows of small pieces of transparent shells framed in wood, which renders the apartments exceedingly dark. The floors of the houses are of a composition of lime made from shells, which, if properly prepared, is extremely durable, and takes so smooth a polish, that a person may see his face in it.

This island is of peculiar importance, on account of its excellent harbour, which is said to be capable of accommodating 1000 vessels at anchor, and is completely sheltered from every wind. On the whole continent of India we do not possess one good harbour; so that, on the approach of the monsoons, all vessels are obliged to stand out to sea, in order to prevent inevitable destruction. At these seasons, the harbour of Bombay, and Trincomallee, in the island of Ceylon, are the only ports we possess which are capable of affording a safe retreat. On account of the peculiar importance of Bombay in this respect, it is furnished with convenient dock yards, and a marine arsenal, for building and refitting ships; and, of late years, a considerable number of vessels have been built on this island, of the celebrated teck wood, which grows on the neighbouring continent; but it is found they can be furnished at a cheaper rate from the port of Rangoon, in the Birman empire.

The population of this island has increased to a singular degree since it fell into the hands of the English. Under the Portuguese government, it is said to have contained only about 10,000 inhabitants; and Niebuhr informs us, that, when he visited Bombay in 1763, they were estimated at 140,000, although within 20 years they did not amount to 70,000, so that in this short period the number appears to have been more than doubled. In the year 1803, Sir James Mackintosh, the eloquent recorder of this island, computed the number of inhabitants at 150,000. These consist of English, Portuguese, Indian Catholics, Hindoos, Persees, Mahometans of different sects, and some Armenian Christians. The English have a handsome church at Bombay; and the establishment of chaplains for their presidency is four in number, but the list is never full. The Roman Catholics have a bishop of Bombay; they are very numerous, and their churches are sumptuously ornamented within. Government does not, however, allow the Catholics to exert their zeal for the conversion of the natives, but under considerable restrictions. If any person chooses to embrace the Catholic faith, the reasons must be laid before the government, and, if they are judged valid, he is allowed to make profession of it. The priests complain of the difficulty of obtaining this permission; but they still meet with considerable success among the negro slaves.

Bombay is the seat of the English government for the coast of Malabar. The council consists of a governor and three members; but they are under the controul of the government-general of Bengal, with respect to treaties of peace with the native powers, the making of war or concluding of peace, collecting and applying revenues, levying and employing forces, &c.; and they are required in all cases to obey the orders of the government-general, unless the directors of the company have sent out contrary orders not known to the government-general, of which, in that case, they are to give the government immediate advice. See Rennel's *Memoir of a Map of Hindostan*, p. 31. Cruttwell's *Gazetteer*, vol. i. Percival's *Account of Ceylon*. Syme's *Embassy to Ava*. Buchanan's *Memoir on the expediency of a Religious Establishment for India*. *Asiatic Register*, vol. v. Niebuhr's *Travels*, vol. ii. p. 374—391. (W. B.)

BOMBIC ACID. See CHEMISTRY.

BOMBYLIUS, a genus of dipterous insects. See ENTOMOLOGY.

BOMBYX, a genus of lepidopterous insects. See ENTOMOLOGY.

BOMMEL-WAERT, called by Cæsar INSULA BATAVORUM, is an island in Holland formed by the Meuse and the Wahal. It is about fifteen miles long from west to east, and nearly six miles broad. It contains the strong town of Bommel, the town of Louvestein, and the three forts of St Andrew, Voorn, and Crevecoeur. The town of Bommel is situated in a plain, fertile in grain and fruits. Its commerce, which was once very considerable, has now passed to *Bois-le-Duc*, chiefly on account of a bank of sand, about 900 feet, which is formed in the Wahal, and prevents vessels from repairing to Bommel. Peuchet says, that the town contains 600 houses, and 300 inhabitants, which is two houses to every inhabitant. He must certainly have meant 3000. (*j*)

BONA, BONNE, or BLAID-EL-ANEB, the *Aphrodisium* of Ptolemy, a sea port town of Algiers, in the province of Constantia, situated near the mouth of the Seibouse. It was formerly a rich and populous town, but its appearance is now mean, and its population greatly diminished. Although its two harbours are both inconvenient and insecure, from being in a great measure choked up, yet a great quantity of corn, butter, oil, hides, wax, and wool, are annually shipped from the French factory at Bona. The vessels are obliged to lie near the Genoese fort, about a league to the east of the town. The surrounding country produces corn and fruits, and rears great numbers of cattle, but is greatly exposed to the ravages of the wandering Arabs. The town and harbour are capable of great improvement. The Genoese have a coral fishery upon the eastern bank of the bay of Bona. E. Long. 7° 45′, N. Lat. 36° 52′. See Shaw's *Travels in Barbary*, p. 46. (*j*)

BONAIRE, or BUEN-AYRE, the name of one of the windward islands, situated about 60 miles from the north coast of South America. It is about 30 miles from Curaçoa, and nearly 50 miles in circumference. The harbour, which is on the south-west of the island near the middle, is tolerably deep.

Bonaire is inhabited solely by a small number of negroes, and by the Dutch garrison. The former plant maize, yams, and potatoes, and rear goats, which they cure by means of the salt obtained from the salt pond at the south-east extremity of the island. There are horses, bulls, and cows, but no sheep here. The vegetable productions of this island, and the salted goat flesh, and the salt itself, are daily sent off to Curaçoa, as provisions for the garrison and negroes of that island. Cotton is also produced here. W. Long. 68° 25′, N. Lat. 12° 15″. (*w*)

BONAVISTA, or BUENA-VISTA, the most eastern of the Cape de Verd Islands, discovered in 1450, is about 24 miles long, and 15 miles broad. There are two bays which are frequented by vessels. One of them, called the English Bay, is very spacious, but has numerous shallows. The other, which is called the Portuguese Bay, though less commodious for debarkation, has the advantage of being near the town, and has nothing injurious to shipping but its banks.

The productions of Bonavista are, salt, indigo, and cotton. Those who come here for salt receive it from the mines, and carry it a little distance to a proper place for drying it. The inhabitants then convey it to the ship by means of asses, which travel in troops of 15 each, every troop being under the charge of a negro.

The indigo, which grows without cultivation, is gathered by the inhabitants; but they have not the art of separating the dye, and of making what in the West Indies is called blue stone. They satisfy themselves with bruising the green leaves in a wooden mortar. They next form it into a kind of paste, of which they make round balls, that are dried for use.

Though the cotton tree grows naturally on the island, yet its culture is greatly neglected by the natives. They never think of collecting it till some vessel arrives to purchase it. Roberts maintains, that the island could furnish annually the cargo of a large vessel; and he informs us, that in some years, when it has failed in the other islands, it has been produced in great abundance in Bonavista.

The surface of the island is low towards the sea, but hilly in the interior, particularly towards the north-east, where there is a hill, probably volcanic, from its resembling a truncated cone. There is still a higher hill in the south-west. The soil is sandy and uncultivated, and the inhabitants live on fish, goats, turtle, and milk. W. Long. 22° 47′, N. Lat. 16° 6′. (Q)

BOND, in Law, is a deed, or written obligation, whereby a person binds himself, his heirs, executors, and administrators, to pay a certain sum of money, or perform some other act, in favour of another, against a day appointed. A bond in this simple form is called a *single* one (*simplex obligatio*); but, in general, a condition is added, that, if the obligor does some particular act, the obligation shall be void, or, otherwise, it shall remain in full force. If the condition is not performed, the bond becomes forfeited, or absolute at law, and charges the obligor while living; and after his death, the obligation descends upon his heir, who (on defect of personal assets) is bound to discharge it, provided he has real assets by descent.

Executors and administrators are bound, although the words, "heirs, executors, and administrators," should be omitted in the bond; but heirs are not bound, unless they be expressly named. And if a bond be taken to a man, his heirs and successors, the executors and administrators shall have the advantage of it, and not the heir or successor, the bond being in the nature of a *chattel*.

The *condition* of a bond must be such as is *possible*, and *lawful*; and if the matter or thing to be done be impossible, or contrary to some rule of law that is merely positive, or the condition itself be repugnant, insensible, or uncertain, it becomes void, and the obligation stands single and unconditional. If the condition be possible at the time of entering into the bond, but afterwards becomes impossible, by the act of God, the act of the law, or the act of the obligee himself, it is void, and the penalty of the obligation is saved: as if a man be bound to appear next term, and dies before the period arrives. If the condition be to perform any criminal act, or to do any thing that is *malum in se*, as to kill a person, &c. the obligation itself is void. So also are bonds made by *duress*; by *infants*, by *feme coverts*, &c. If a bond be made by a *feme covert*, she may plead her coverture, and conclude *non est factum*, &c. her bond being void. But if an infant seal a bond, and be sued thereon, he is not to plead *Non est factum*, but must avoid the deed by special pleading; for his bond is only voidable, and not in itself void.

If no *time* be limited in a bond for payment of the money, it is held to be due presently, and payable on demand. The judges, however, have sometimes appointed a convenient time for payment, having regard to the distance of place, and the time necessary for performance. Where no *place* is specified for performing a condition, the obligor must find out the person of the obligee, if in England, and tender the money, otherwise the bond is forfeited: But when a place is appointed, he is not obliged to seek any further. And where no place is specified for payment of money due on a bond, if the obligor, at or after the day of payment, tenders the money, and the obligee refuses it, the obligor shall be excused; but if he be afterwards sued, he must plead, that he is still ready to pay it, and tender the money in court. If a bond be of 20 years standing, and no demand be proved thereon, nor any good cause of so long forbearance shewn to the court, upon pleading *Solvit ad diem*, it shall be intended paid.

When several persons are bound *severally* in a bond, the obligee may sue all of the obligors, either together or apart; and, in the latter case, he may have several judgments and executions: But if he obtain full satisfaction from one, that shall discharge the rest. When persons are bound *jointly*, and not *severally*, all the obligors must be sued; and if only one be prosecuted, he is not obliged to answer, unless the rest be sued likewise.

When a bond was forfeited, or become single, the whole penalty was formerly recoverable at law: But, in consequence of the interposition of the courts of equity, a man was not permitted to take more than in conscience he ought; that is, his principal, interest, and expenses, if the forfeiture accrued by non-payment of money borrowed; the damages sustained, upon non-performance of covenants, &c. And it is enacted by the statute 4 and 5 Ann. c. 16. that, in the case of a bond conditioned for the payment of money, the payment or tender of the principal sum due, with interest and costs, shall be a full satisfaction and discharge, even although the bond be forfeited, and a suit commenced. See Blackst. *Comment.* b. ii. c. 20. Jacob's *Law Dict.*

Bonds, according to the law of Scotland, are either *heritable* or *moveable*. The taking of interest being prohibited by the canon law, those persons who wished to make profit of their money, by putting it out to interest, were, before the Reformation, obliged to purchase rights on land constituted by infeftment; in consequence of which, the lands were burthened with a certain annual rent to the receiver, redeemable by the proprietor, on repayment of the purchase money. These being bargains affecting land, the rights were understood to be heritable. And even for some time after the Reformation, the form of these rights was preserved, with little variation. But afterwards these rights were changed into proper bonds, by which the debtor becomes personally bound to repay the principal sum, and interest, and, as a further security, obliges himself to infeft the creditor in the annual rent. All bonds, therefore, bearing a clause of infeftment are *heritable*.

Bonds merely *personal*, on the other hand, have always been *moveable* before the term of payment; but, afterwards, they were anciently considered as *feoda pecuniæ*, and consequently heritable. But by the statute 1661, c. 32. all sums contained in contracts and obligations are made moveable in regard to succession; although they still continue heritable with respect to the fisk, and to the rights of husband and wife. The statute excepts bonds bearing an obligation to infeft, and bonds payable to heirs and assignees, secluding executors; which continue heritable in all respects.

A bond taken payable to heirs, without any mention of executors, descends, not to the heir in heritage, but to the executor. But a bond taken to heirs-male, or to a series of heirs, is heritable. Bonds, originally moveable, may become heritable, either by destination, or in consequence of a supervening heritable security. But heritable rights do not become moveable by supervening moveable securities.

All bonds, whether merely personal, or even heritable, before seisin, may be affected by creditors, either by the diligence of adjudication, which is peculiar to heritage, or by arrestment, which is peculiar to moveables. Bonds secluding executors, although they descend to the creditor's heir, are payable by the debtor's executors, without relief against the heir. See Erskine's *Prin. of the Law of Scot.* b. ii. t. ii. § 3. *et seq.* (z)

BOND OF BOTTOMRY. See BOTTOMRY.

BONDOU, a kingdom in Africa, situated in W. Long. 11° 50′, N. Lat. 13° 53′, betwixt the Gambia and Senegal rivers; and bounded on the east, by Bambouk; on the south-east and south, by Tenda, and the Simbani wilderness; on the south-west, by Woolli; on the west, by Foota Torra; and on the north, by Kajaaga. The name of its capital is Fatteconda. The country is woody, and elevated; but in fertility it is believed to be equal to any part of Africa. In the month of December the banks of Falemé, the chief river, are covered with large and beautiful fields of corn, called by the natives *manio;* and by botanical writers, from the depending position of the ear, *holcus cernuus*.

The inhabitants are of the tribe of the Foulahs, of a yellow complexion, with small features, and soft silky hair. They are naturally mild, and gentle in their dispositions; but they consider all the negro natives as their inferiors; and, when speaking of different nations, always rank themselves among the white people.

Their religion is Mahometan, and they pay a sacred regard to the laws and authority of the prophet. Religious persecution is, however, unknown among them; for no molestation is given to those who chuse to retain their ancient superstitions. In the different towns schools are established, in which the Pagan as well as the Mahometan children are taught to read the Koran, on the principles of which, their character and manner are invariably formed. From the nature of their religion, they are less hospitable to strangers, and more reserved in their manners, than their Pagan neighbours. With the Mahometan faith the Arabic language has of course been introduced: their native tongue abounds in liquids, but their articulation is uncouth.

In the occupations of pasturage and agriculture, their industry is remarkable; and it has not only secured to them all the necessaries of life, in the greatest abundance, but also, comparatively speaking, raised them to a high degree of opulence. In the management of their cattle they are extremely skilful, and, by kindness and familiarity, have made them very gentle and tractable. When night approaches, they collect them from the woods, and secure them in folds; and in the middle of each fold a small hut is erected, in which some herdsmen keep watch during the night, to prevent the cattle from being stolen, and to keep alive the fires which are kindled round the huts, to secure them from the attack of wild beasts. The milk of their cows is of an excellent quality; and is used, but not till it be quite sour, as the chief article of diet. The rich cream affords them great quantities of butter, which, when melted and freed from its impurity, is preserved in earthen pots, for the purpose of seasoning their dishes, and anointing their bodies. They are, however, unacquainted with the art of making cheese; partly from their rooted prejudice against every new invention, and partly, from their mistaken belief that the advantage would not sufficiently compensate for a process, which appears to them so tedious and troublesome. They possess also some excellent horses, which appear to be a mixed breed of the Arabian with the original African.

On the river Falemé, whose current is rapid, and its banks rocky, the natives are much employed in fishing; and they catch the large fish in the following manner: They build walls of stone across the stream, open places being left through which the water rushes with great force. Below these openings they place baskets, more than twenty feet in length, made of split cane; and when once the fish have entered them, the force of the stream prevents them from returning. The small fish, which are about the size of sprats, are taken in great numbers in hand nets, which the natives weave of cotton, and use with great dexterity. These are prepared for sale by being pounded entire, the moment they are catched, in a wooden mortar; and then are exposed to dry in the sun in large lumps, like sugar loaves. Their smell is very disagreeable; nevertheless they are esteemed a great luxury, and bring a considerable profit in the Moorish countries, to the north of the Senegal, where fish is little known.

The central situation of Bondou, betwixt the Gambia and Senegal rivers, has rendered it a place of great resort, both for the Slatees, or free black merchants, who trade chiefly in slaves from the coast to the interior; and for occasional traders, who frequently come from the inland countries to purchase salt. They also barter corn for iron, shea-butter,* and gold-dust; and they sell a variety of sweet smelling gums, which are used as perfumes.† The customs and duties on travellers are very heavy. In almost every town, an ass load pays a bar of European merchandise;‡ and in the capital one Indian baft, or a musket, and six bottles of gunpowder, are exacted as the common tribute. In consequence of these duties, the king of Bondou is well supplied with arms and ammunition, and is formidable to the neighbouring states.

The following interesting account of the journey of M. Rubault through the kingdom of Bondou, is given by M. Durand, under whose orders he was employed.

"On the 10th of February 1786, Rubault set off early in the morning, and arrived at noon at the village of Tilliko, a frontier of the kingdom of Bondou: this is probably the same village which Mungo Park calls Tallika, and by which he also entered the kingdom. The major part of the inhabitants of this village are Foulahs, who profess the Mahometan religion: they are merchants, who enrich themselves either by supplying the caravans which pass through their country with provisions, or by the sale of ivory, which they procure by hunting elephants, to which they are accustomed from their infancy.

By the 14th Rubault had reached the village of Coursan, the ordinary residence of the king of the country, whose name is Almami. It is worthy of remark, that Mr Park no longer followed the track of my traveller; for he indicates the residence of the king of Bondou to be at the village of Fatteconda, on the right bank of the river Falemé, and at a great distance from Coursan. Both gentlemen saw the king, and have given a description of the palace which he inhabited, which exactly correspond; hence we can only reconcile the difference in the places to arise from the king having palaces at each of them.

His majesty being at a country seat, the stranger was received by his prime minister, who supplied him with provisions, and told him that the king would arrive the next day. On the 14th the queen saw him, and entreated him to stop a little longer, as she had sent an express to her husband, who shortly returned with intelligence that he was coming. An ox was therefore killed; and the king, on arriving, sent for our traveller.

After asking him the usual questions, as to what had brought him into his country, he wished to know, if I had not sent him some present? Rubault answered, that I intended to do so, but that he had distributed all the merchandise which I had given him. He, however, promised to send the king whatever he might wish for, as soon as he arrived at Galam. His majesty appeared surprised, and replied, that his father used to receive great presents from the factory at Galam; but he had had nothing from them. He concluded by adding, that, as Rubault had brought him no present, he would not suffer him to depart. The next day, however, he became more tractable, told him that no harm should happen to him; but insisted on receiving a present, it being an ancient privilege which he would not forego. It was at length agreed, that Rubault should send him a compliment from Galam, which was fixed at two pieces of guinea, a fine musket, four pounds of powder, one hundred flints, one hundred bullets, and a pair of double-barrelled pistols. This demand from so powerful a king was considered as very moderate; nevertheless, by way of making sure of the articles, he ordered three men to go with Rubault as far as Galam, under pretence of escorting him, where they faithfully received the promised allowance, as well as several magnificent presents for the king's women.

The queen having reported her opinion to the other women, they all wished to see the traveller, and he was in consequence conducted to the square where they resided. Immediately on his entrance, they all rushed out, surrounded him, and expressed their astonishment by laughing and shouting. Several of them would touch his eyes, and others, his hands, nose, &c. at which they expressed surprise and curiosity: they then asked him a number of questions, as to the origin of the colour of his skin, as well as about the white women, their amorous propensities, and the conduct of their husbands towards them. Rubault satisfied them as well as he could, and did not fail to flatter them. Indeed, he asserts, that there were many of them that were handsome and well shaped. Most of them were young: he endeavoured to count them, but could not, as they were continually running about him; he, however, supposes, that there were at least fifty.

The village of Coursan is surrounded with palisades, and contains about 1200 inhabitants. Rubault then continued his journey; and on the 17th quitted the kingdom of Bondou. The duties or customs are very rigorous in this state; and in many of its towns, the value of a bar in European merchandise is paid for the passage of a loaded ass. In the part where the king resides, they demand a musket and a barrel of powder. I lately spoke of the preparations for war, which this sovereign was making against the king of Bambouk: the expedition was successful, and the conquered party was obliged to cede all the countries and villages on the eastern bank of the Falemé.

If it were not for the uncharitable maxims of the Koran, the Foulahs of Bondou, who are naturally good, would be kinder to strangers, and less reserved in their conduct towards the Mandingos: my traveller, however, had nothing to complain of, as he was very well treated.

The government is under the influence of the Mahometan laws, with the exception of the king and his family; but though the great people of the state be Mussulmans, they are wise enough not to sanction religious persecution; and Pagans and Mussulmans consequently live in peace together.

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* Butter made from the fruit of the shea tree.

† Cotton and indigo are much cultivated: the former they manufacture into a strong cloth, which, when dyed of a deep blue with indigo, they sell to their neighbours the Bamboukians, and receive their gold in exchange.

‡ *Bar* is the nominal money; a single bar is equal in value to two shillings sterling.

The Foulahs have a particular language; but almost all of them speak Arabic; they are graziers, farmers, and merchants, and every where live in abundance; but at Bondou they enjoy in profusion all the necessaries of life." See Park's *Travels*, chap. iv.; Golberry's *Travels*, vol. i.; Rennel's *Proceedings of the African Institution;* and Durand's *Voyage to Senegal*, chap. xv. (A. F.)

BONES. See ANATOMY, CHEMISTRY, and SURGERY.

BONI, or BONY. See CELEBES.

BONNE, the *Ara Ubiorum*, and the *Colonia Julia Bona Verona* of the ancients, was formerly the residence of the electors of Cologne, but is now a town of France in the department of the Rhine and the Moselle. Bonne is most beautifully situated on the left bank of the Rhine. The streets are narrow and awkwardly built; and, besides perpetually intersecting one another, are dirty and ill paved. The principal objects of curiosity in this place are the metropolitan church, and the fine area before its porch; the town-house, in the Gothic style, which is adorned with paintings; the great rampart, from which there is a charming view upon the Rhine; and the palace, which was formerly the residence of the electors of Cologne. This palace, which stands without the city, was built by the elector Clement Augustus in 1777, on the spot where no fewer than four palaces had been burned to the ground. The prospect which it commands embraces the windings of the Rhine; part of the village of Poppledorf; the *ci-devant* monastery of Gruizberg, on the summit of a hill; the spires of Coblentz; and, in the distance, the seven mountains, covered with vineyards. This building is now appropriated for the use of the French government; and in the left wing, towards the Orange Garden, Bonaparte placed the Lyceum, one of the central schools, which is a very flourishing institution, and conducted by able teachers. Under a quadruple row of lime trees, there is a fashionable promenade, which leads to a small country palace.

About three miles from Bonne are the mineral springs of Draitsch, which contain fixed air, iron, magnesia, and salt. They are situated at the base of the celebrated hill of Godesberg; and an assembly, and other rooms, with pleasure gardens, were constructed on the spot by the late elector, for the comfort of those who frequented the springs. These buildings, however, are now converted into barracks, and about 3500 linden trees, which formed a fine walk to Bonne, have been cut down. Number of houses 1000. Population 8837. East Long. 8°, North Lat. 50° 41′. See Carr's *Travels through Holland*, &c.; *An Itinerary from London to Constantinople in* 1794, in Philips' *Collection*, &c. vol. i.; and Reichard's *Guide des Voyageur en Europe*, tom. ii. p. 241. (*w*)

BONNER, EDMUND, Bishop of London, was born at Hanley in Worcestershire, and is supposed to have been the natural son of one Savage, a priest; though others affirm, that he was the legitimate son of one Bonner, a poor man, whose residence is still said to retain, in that part of the country, the name of *Bonner's Place*. About the year 1512, he entered a student in Oxford; and, in 1519, he was admitted bachelor of the canon and of the civil law. He next entered into holy orders; and, by the favour of Cardinal Wolsey, he, at one and the same time, enjoyed the several ecclesiastical livings of Blaydon and Cherry Burton, in Yorkshire; Ripple, in Worcestershire; East Dereham, in Norfolk; prebend of St Paul's; and the archdeaconry of Leicester. Being more distinguished by his ability in conducting business than by his learning, Wolsey next appointed him his commissary for the Faculties; and he was with that prelate at Cawood, when he was arrested for high treason. After Wolsey's death, he found means to ingratiate himself with Henry VIII., who appointed him one of his chaplains; a favour which he afterwards repaid to that monarch, by promoting his divorce from Queen Catharine of Spain, and by his assistance in abrogating the pope's supremacy in England. He was also a great favourite of Lord Cromwell, the secretary of state; by whose recommendation he was sent as ambassador to several courts. Being a man of a bold temper, he was, in 1532, chosen as a fit person to go to Rome, along with Sir Edward Karne, to apologise for Henry's non-appearance upon the pope's citation; and, in the following year, he was again sent to Rome, to deliver his sovereign's appeal to the next general council, from a sentence of excommunication pronounced by the pope against Henry on account of his divorce. On that occasion, Bonner demanded an audience of the pope, and executed his sovereign's commission so rudely, that the pope threatened to cause him to be thrown into a cauldron of melted lead: upon which he thought proper to make his escape. Having returned to England, and being at that time in high favour with the reformers, he was, upon their application, promoted, first to the see of Hereford, and next to that of London; which they found reason afterwards deeply to regret, when he became a most violent enemy of the Reformation.

Bonner.

He was ambassador at the court of Charles V., in 1547, when Henry died; and although, during that reign, he had appeared very zealous against popery, and had strenuously supported all the measures of his sovereign for abrogating the pope's supremacy, yet his subsequent conduct showed, that he had had his own preferment solely in view; for, in that same year, on the accession of young Edward VI., he refused to take the oaths of abjuration and allegiance, and entered a protest against the king's injunction, and against the homilies. For this he was committed to Fleet prison; but having submitted and recanted, he was released. He now saw, that it would be necessary for him to give a public compliance with the measures taken to advance the Reformation, while, privately, he did every thing in his power to counteract them. He was summoned before the privy council, and admonished; but, as his after conduct clearly evinced, that he supported the church of Rome, and that he despised the king's authority, commissioners were appointed to proceed against him; and, after a long trial, he was committed to the Marshalsea, and deprived of his bishoprick. Bishop Burnet remarks, that, on his trial, he behaved more like a madman than a bishop.

On the accession of Queen Mary, in 1553, he was restored to his bishoprick; and, the following year, he was created vicegerent and president of the convocation, in the room of Archbishop Cranmer, who was committed to the Tower. The persecution which arose against the reformers, now gave him an opportunity of gratifying his cruel and vindictive temper; and he directed all his power and influence against them in the most malignant and violent manner. He obtained a commission for searching out and punishing all heretics, and for erazing from the public records all the proceedings of Henry VIII. against the pope, and particularly the accounts of the visitations of the monasteries, and the renunciation of the papal authority by the monks. He dismissed many of the reformed bishops; and set up mass in St Paul's, even before the act for restoring it was passed. In the short space of about three years, from the beginning of the year 1555 to the year 1558, it is said, that he caused no fewer than two hundred persons to be committed to the flames; besides many who, by his orders, were imprisoned, publicly whipped, and cruelly tortured.

After Elizabeth succeeded to the crown, in 1558, the face of affairs, with regard to religion, was completely changed. Bonner, however, (although it was well known that Elizabeth would espouse the cause of the Reformation,) had the impudence to go with the Protestant bishops to congratulate her upon her accession; but she received him with that cool reserve which he so justly deserved. For some months he was allowed to remain unnoticed; but, in 1559, being called before the privy council, and having refused to take the oaths of allegiance and supremacy, he was again deprived of his bishoprick, and thrown into Marshalsea, where he died in 1569. His body was interred by his friends, in the most private manner, during the night, lest any indignity should have been offered to it by an enraged populace.

Bonner's temper was violent, and his disposition cruel. It is also said, that he was addicted to swearing, and that he sometimes made a prophane use of the Holy Scriptures. His ruling principle was ambition, which led him to sacrifice every thing for the advancement of his temporal interest. Destitute of merit, he raised himself, during the reign of the impetuous Henry, by offering his services to those who were in power, and by making the will of his prince the rule of his conduct; and, in the short but bloody reign of Mary, he persecuted the Protestants with a barbarity, which will for ever render his character and his memory detestible. It has been justly remarked, that it is a clear proof of the lenity of the reformed church, that such a man was permitted to end his days in a prison.

Further particulars of his life may be found in every *History of England*, during the reigns of Henry VIII., Edward VI., and Mary. See also *Biog. Brit.* and Burnet's *History of the Reformation.* (A. F.)

BONNET, Charles, an eminent naturalist, was born at Geneva on the 13th March 1720, and was the only son of a Protestant refugee, who sought for shelter in Switzerland from the religious persecutions with which France was at that time agitated. His father sent him early to school; but, in consequence of a defect in hearing with which he was afflicted at an early age, and probably from his being unable to participate in the bustle and rivalry of a public seminary, he made little progress in his studies, and was placed under the care of a domestic tutor, who inspired him with a taste for general literature. In 1736, the perusal of La Pluche's interesting work, entitled, *Le Spectacle de la Nature*, turned his attention to those branches of natural history, in the cultivation of which he obtained such distinguished eminence. He investigated with particular success the structure and habits of the curious insect called the *formica leo*, or ant lion, and detected many interesting facts which had escaped the notice of Poupart and Reaumur. He repeated many of Reaumur's experiments on insects. He made several interesting observations on caterpillars; and, at the early age of eighteen, he had the courage to communicate the results of his researches to Reaumur, who admired the ingenuity of young Bonnet, and encouraged him to proceed in the study of natural history. His researches, in 1740, respecting the generation of aphides, or vine fretters, conducted him to a very curious discovery regarding these singular insects. He found, that the impregnation of a female aphis by the male transmitted the prolific quality to its offspring even to the tenth in succession, so that each succeeding female, within these limits, will produce its young without any sexual intercourse with the male.* This discovery was communicated, in a memoir, to the Academy of Sciences at Paris, who immediately ranked its ingenious author among the number of its corresponding members. These experiments were of such a delicate nature, and required such minuteness of observation, and such close attention, that they brought on a weakness of sight, from which he never afterwards recovered.

During these inquiries, Bonnet was prosecuting, with extreme reluctance, the study of the law; a profession to which he had been destined by his father. He continued, however, to perform this unpleasant task till the year 1743, when he received the degree of doctor of laws, on which occasion he abandoned for ever the study of the law. In the year 1741, he discovered, that the reproductive power of the polypus was, in some measure, possessed by different kinds of worms; and, in 1742, he made some new observations on the tape worm, and found that butterflies and caterpillars respired by means of their *stigmata*, or pores. In the year 1743, he communicated to the Royal Society of London a long paper, entitled, *An Abstract of some new Observations on Insects;* the substance of which was republished in his *Insectologie*, which appeared in 1744, and which contained his observations on worms and aphides. In consequence of this paper, he was elected a member of the Royal Society.

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* See his remarks *sur les Pucerons*, in his *Traite d'Insectologie;* and in his *Œuvres*, tom. i.

The fatigue which accompanied these incessant labours, produced a severe effect upon his health, and for some time he was compelled to relinquish entirely his favourite pursuits. By this relaxation from study, his eye-sight was considerably improved, and his general health so greatly re-established, that, in 1746, he renewed his studies by a course of experiments on moss and other vegetable substances. These experiments were succeeded by his inquiries respecting the ascent of sap in vegetables, and the action of the upper and under leaves of plants; the result of which were given to the world, in 1754, under the title of *Recherches sur l'usage des Feuilles dans les Plantes*, which was improved by a supplement, in 1779, and afterwards published in the second volume of his works. He published also another treatise on a similar subject, entitled *Sur la Fecondation des Plantes*, which is given in the fifth volume of his works.

From this fertile path of experiment and observation which Bonnet had so long pursued, he was allured, by the study of Malebranche and Leibnitz, into the toilsome but more seducing track of metaphysical speculation. The results of these new inquiries were given to the world in *An Essay on Psychology*, published at London, anonymously, in 1755; and in an *Analytical Essay on the Faculties of the Soul*, which was printed in quarto at Copenhagen, at the expence of the King of Denmark. Both these works were well received; though the latter exposed him to the charge of materialism.

Unable in some measure, both from his studious habits and the defect of his hearing, to participate in the bustle and amusements of active life, he sought in domestic happiness for those comforts which nature had denied him. In 1756, he married one of the family of De La Rive, the aunt of the celebrated Saussure. This lady contributed greatly to the happiness of Bonnet, whom she had the misfortune to survive.

In the year 1762, Bonnet published at Amsterdam, in 2 vols 8vo, a work entitled, *Contemplations sur les Corps Organisés*. From some misapprehension of the principles which this work inculcated, M. des Malesherbes prohibited it from being sold in France; but the interdict was removed, in consequence of a remonstrance from the author. His next production, entitled, *The Contemplation of Nature*, appeared in 1764, in 2 vols 8vo. This popular and entertaining work, adorned with all the charms of simple eloquence and enlightened piety, was translated into most of the languages of Europe. In 1769, he published at Geneva, in 2 vols 8vo, his *Palingenesie Philosophique*; a work which treats on the past and future state of living beings. To this work he annexed an "Enquiry into the Evidence of the Christian Revelation, and the Doctrines of Christianity," which was published separately at Geneva in 1770, along with a Dissertation on the Existence of God. The German translator of this work dedicated it to a learned Jew, whom he summoned either to refute it, or acknowledge his conviction. Bonnet hearing of this improper challenge, assured the Jew that he was not a party to such a defiance.

The study of natural history having again invited his attention, he published in Rozier's Journal a method of preserving insects and fish in cabinets; and in 1774, a paper on the loves of plants, in consequence of his having observed a kind of opening in the pistil of a lily. The other subjects with which he was at this time occupied were, the reproduction of the heads of snails, the water salamander, the pipa or Surinam toad, the manners of bees, the blue colour acquired by exposing mushrooms to the air, and other branches of natural history.

The reputation of Bonnet was now fully established, and he had the honour of corresponding with many of the most distinguished naturalists of Europe. In 1746, he had been chosen a member of the Academy of Bologna, and introduced to the acquaintance of the celebrated Zanotti; and he was, in 1783, elected one of the foreign associates of the Academy of Sciences at Paris. From 1752 to 1768, Bonnet continued a member of the great council of the republic. A love of retirement, however, induced him to withdraw from this active situation, and spend the remainder of his life among the simple pleasures of the country, and in the select society of his friends. His time was chiefly spent in the revisal of his works, which appeared in French at Neufchatel, in 9 vols. 4to, and 18 vols. 8vo. Exhausted with these labours, his health began visibly to decline in 1788, when a dropsy in the chest assailed his constitution. In 1793 it had reached an alarming height, and, after numerous and severe sufferings, he expired on the 20th of May 1793, at the age of 73. A public funeral was decreed to him by his fellow citizens; and his nephew, the celebrated Saussure, pronounced upon him a funeral eulogy.

The talents of Bonnet, though not of the first order, were such as to entitle him to a high rank among the naturalists of the 18th century. His discoveries were useful, but not brilliant; and, if his writings are not distinguished by that depth of thought and acuteness of penetration which indicate a powerful mind, they are marked by an originality of conception, a clearness of illustration, and a simplicity of eloquence, which entitle them to no ordinary praise. The excellence of his private character, the wisdom and moderation of his public measures, and his rational piety and regard for the Christian religion, are qualities which posterity will long admire. See *Memoire pour servir a l'Histoire de la vie et des ouvrages de M. Charles Bonnet*. Berne, 1794. (H)

BONNETIA, a genus of plants of the class Polyandria, and order Monogynia. See BOTANY. (w)

BONONIA. See BOLOGNA.

BONONIAN STONE, a stone found near Bologna, which, when properly prepared, has the property of emitting light in the dark. See Keysler's *Travels*, vol. iii. p. 301. Homberg, *Mem. Acad. Par.* tom. ii. p. 12, 133. Nollet, *Mem. Acad. Par.* 1743, Hist. 105. *Comment. Bonon.* vol. i. p. 184. *Phil. Trans.* N° 21, N° 134; and Hooke's *Philosophical Collections*. See also PHOSPHORUS, where this subject will be fully discussed. (w)

BONONIAN JARS or BOTTLES, are small thick jars of unannealed glass, which break into a thousand pieces by the impulse of a single grain of sand. See Bruni, *Phil. Trans.* 1745, p. 272; and Dr Thomas Young's *Nat. Phil.* vol. i. p. 644. See also ANNEALING. (*w*)

BONPLANDIA, a genus of plants of the class Pentandria, and order Monogynia. See BOTANY. (*w*)

BONTIA, a genus of plants of the class Didynamia, and order Angiospermia. See BOTANY. (*w*)

BONZES, a name given to the priests and devotees of the god Fo, in China, Japan, and Tonquin, and other oriental countries. They are distinguished by different names in the different countries where their superstition prevails. In Siam they are called *Talapoins;* in Tartary, *Lamas; Ho-chang* in China; and in Japan, *Bonzes;* by which name they are best known among Europeans. They are exceedingly numerous, and generally live in separate communities, in places wholly consigned to themselves. Splendid apartments are assigned to them in the temples of their god, around which they have rich and extensive domains. Their pagodas are most numerous in the province of Kiang-Nan, where they are agreeably situated, and well endowed. In the north of China, on the other hand, the greater part of these pagodas have fallen into ruins. The island Pon-to, near Chusan, is wholly occupied by bonzes, who lead there a recluse life, like monks in a convent. There are also female bonzes, who attach themselves to particular temples, and, like nuns in the Romish church, take a vow of perpetual celibacy. These devotees worship their divinity under a great variety of forms, representing the different animals into which they suppose him to have transmigrated previous to his deification. Quadrupeds, birds, reptiles, and the vilest animals, had temples, and became objects of public veneration; because the soul of the god, in his transmigrations and metamorphoses, might have inhabited their bodies. See Grozier's *China,* vol. ii. p. 218.

If we may credit the accounts given of them by the European missionaries, the bonzes are the most odious set of impostors that ever disgraced the priestly character. The hatred which these missionaries naturally entertained against a set of Pagan priests, who were the most violent adversaries of the Christian faith, renders it necessary, indeed, to regard their representations with some suspicion. Yet, after every fair allowance that can be made for the exaggerations of prejudice, it is impossible to contemplate the character of the bonzes, without feeling horror for their crimes, and a mingled emotion of contempt and compassion for the credulous and ignorant people who are the dupes of their knavery. Among the precepts which they enjoin on all the faithful votaries of Fo, they inculcate, with particular eagerness, deeds of beneficence to the bonzes, as the surest means of reaping the full benefit of their prayers and mortifications; obtaining the remission of their sins; and a happy transmigration in a future life. The Jesuits, who declaim so vehemently against these crafty priests, were never half so accomplished in the arts of hypocrisy and fraud. Their ordinary income must be considerable; for they are consulted in all cases of sorcery, which forms an essential part of every public and private deliberation; their advice is taken in the most common affairs of life; and they preside at funerals, and mark out the places of interment suitable to the deceased. From this last office they derive considerable emoluments; for there is generally a secret understanding between them and the proprietors of the ground, who share the spoil. Not content, however, with these regular means of subsistence, they have recourse to the lowest and most unwarrantable tricks, for the purpose of extorting money from the superstitious. "We saw," says M. de Guignes, "at Hang-Tchedu-Fou, upon the borders of the lake Sy-Hou, a pagoda, which contained five hundred gods. The emperor Kien-Long, then living, was of the number; and it cannot be doubted, that this deification was advantageous to the pagoda, for it was in the best condition. The bonzes shewed us a well, into the bottom of which they let down a light, to discover to us the trunk of the tree of which the pagoda was constructed. This miraculous tree renewed its branches all the time necessary for the construction of the edifices, and ceased to grow as soon as they were finished."

Many of them, who have not the address to extort presents by their knavery, endeavour to procure them by the humbler method of exciting compassion by the penances and mortifications which they voluntarily undergo. Sometimes they appear in the squares and public places dragging large and massy chains, which are fastened round their necks and legs; sometimes they mangle their bodies, and cut their flesh with hard flints till they stream with blood; and sometimes they carry burning coals upon the tops of their naked heads. In this situation, they go about from door to door: "You see," say they to those whom they supplicate, "what we suffer, that we may expiate your sins; can you be so hard-hearted as to refuse us a small pittance?" Father Le Compte mentions a very extraordinary penance, of which he was an eye-witness. A young and handsome bonze, of the most insinuating address, stood erect in a kind of narrow chair, stuck full of sharp nails, pointed in such a manner that he could not move without being wounded. He was conveyed slowly from house to house, and endeavoured to excite the compassion of the people, by declaring, that he had shut himself up in that chair for the good of their souls, and resolved not to quit it till they had purchased all the nails, the number of which exceeded two thousand. Each of these nails, he assured them, would prove a source of numerous blessings to them and their families; and even to purchase one, would be an act of heroic virtue.

Yet all these devices are trifling and harmless when compared with the enormities of which they are often guilty. When any person is so audacious as to provoke them, by withstanding their petitions, or refusing to be duped by their impostures, their diabolical revenge can seldom be satiated without the murder of the unfortunate offender. A mandarin passing with his retinue along the highway, observed an immense concourse of people, and, on coming up to them, found that the bonzes were celebrating an extraordinary festival. On a large theatre was constructed a very high machine, surrounded by a small balustrade, above which a young man put forth his head, rolling his eyes in a very wild and frightful manner. The rest of his body was entirely concealed. In the mean time, an old bonze harangued the people from the theatre, extolling the piety and fortitude of the youth, who had resolved to sacrifice his life to Fo, by throwing himself into a deep rivulet which flowed along the side of the highway. The mandarin expressed his surprise that this heroic young man did not himself explain the motives which induced him to undergo this martyrdom, and requested that he might be permitted to come down in order to converse with him. The bonze, terrified by this proposal, protested, that irreparable evil might fall upon the whole province if the victim opened his mouth. But the mandarin, firm to his purpose, promised to take all the risk of that evil upon himself, and, at the same time, ordered the young man to come down. To this command he replied by a wild irregular movement of his eyes, which seemed ready to burst from his head. "Observe his agitation," cried the bonze, "and judge from that of the injury you do him; already he is sinking under despair, and if you persist he will certainly expire through grief." In spite of these remonstrances, the mandarin commanded his attendants to mount the theatre, and to bring down the young man by force. They found him closely bound and gagged; and no sooner had he recovered his speech, than he demanded immediate vengeance upon the execrable bonzes, who had seized him before break of day; bound him to the machine in such a manner that he could neither move nor speak; and determined to throw him into the river, and to perform their detestable mysteries at the expence of his life. The mandarin ordered the old bonze himself to be thrown into the stream; and the rest of them were carried to prison, and afterwards punished as their atrocities deserved.

With all their pretended sanctity and austerity, too, these infamous wretches are no less voluptuous and profligate, than they are selfish and cruel. Instances of their lewdness are mentioned by creditable writers, the recital of which would disgust the least delicate of our readers. In short, in the black catalogue of human crimes, there can scarcely be found one which does not disgrace the character of the bonzes. Hence the Chinese, though one of the most superstitious nations in the world, generally hold the bonzes in contempt and abhorrence. It is partly the cause, and partly the effect of this contempt, that the numbers of the bonzes are recruited from the dregs of the people. They purchase young children, whom they early initiate in their mysteries, and in all the arts of deception. These in time succeed them, and in like manner transmit their knowledge and depravity to another generation. In general they are so ignorant, as to be unable to explain the true doctrines of their sect. Though subject to no regular hierarchy, they acknowledge superiors, whom they call *ta-ho-chang*, or grand bonzes. This rank entitles those who have obtained it to particular distinctions, and to the first place in all religious assemblies. There are bonzes of all conditions. Some are employed only in collecting alms; others, more eloquent and better informed, are commissioned to visit the literati, and to insinuate themselves into the houses of the great; and others, venerable for their age and grave deportment, endeavour to ingratiate themselves with the fair sex, and preside in the female assemblies, which are held in several of the provinces. These religious assemblies are the source of considerable gain to the bonzes. They are composed of fifteen, twenty, or thirty ladies, most of whom are of some rank, and advanced in life, or rich widows. One of these ladies is elected superior for the space of a year, and at her house all the assemblies are held. Each of the members contributes towards the expence occasioned by ornamenting their oratory; by the celebration of certain festivals; and the assistance of the bonzes.

For the religious tenets and ceremonies of the bonzes, see CHINA. See also Grozier's *General Description of China*, vol. ii.; Du Halde's *China*, vol. i.; Le Compte's *State of China*; and Barrow's *Account of Lord Macartney's Embassy to China*. (*k*)

BOODH. See BUDDHA.

Book defined.

BOOK may be defined, a work composed for the purpose of communicating the knowledge or ideas of its author, on any subject, and with any design. The immense variety of topics which human knowledge embraces, and which reason or fancy may suggest, renders it necessary, for the sake of precision, to distinguish books by different names, according to the objects proposed by them, or the matters which they discuss. Some of these names are specific and appropriate substantives, as romance, poem, novel, history, journal, &c.; while others are merely general appellatives, applicable not to books alone, but to every thing connected with the subject or science from which these appellatives are derived,—as philosophical, theological, metaphysical, mathematical, or chemical. It is necessary likewise to express, by particular names, the various sizes and forms in which books appear; and hence arise the distinctions of folio, quarto, octavo, &c. Short and fugitive pieces are denominated pamphlets, in contradistinction to books, which are of greater length, and embrace more general or more permanent topics.

Different kinds of books distinguished by different names.

Materials of which books have been made.

The origin of books may be traced to as remote antiquity as the manner of expressing thought by alphabetical or hieroglyphic characters. Their form, and the materials of which they were made, varied with the local circumstances of different nations, and their progress in the arts. The etymology of the word *book*, and its equivalent in many languages, indicates that they were originally written on vegetable substances; such as the rind or bark of trees, the leaves of plants, or on tablets of wood. Thus, from the Latin words *liber* and *codex*, we learn, that books were sometimes inscribed on the inner bark, and sometimes on boards cut out of the main body of the tree; and the English word *book*, derived from the Saxon *boc*, the root of which is the northern *buech*, a beech or service tree, evidently shews that the books of our ancestors were of a similar fabric. The custom of making books of bark still continues in several nations which have made but little progress in refinement. A very curious library of this description was discovered some time ago by the Russians among the Calmuc Tartars. The books were exceedingly long and narrow; the leaves very thick, and made of barks of trees, smeared over with a double varnish; the ink, or writing, was white on a black ground. Copies of the Gospels in the Malay tongue are occasionally brought to this country written on oblong slips of bark, fastened together by a cord. The Egyptian papyrus, too, which was first manufactured into paper, was in very common use among the ancients, about the time of Alexander the Great; but as these vegetable materials were of too frail a nature to be long preserved, it was found necessary to have recourse to some substance which might be less liable to be destroyed by accident, or to decay with time. Leather, made of the skins of goats or sheep, was accordingly employed for this purpose; and successive attempts to remedy the imperfections of that substance, gave rise to the invention of parchment. The manufacture of skins into parchment is said to have been first invented at Pergamus, when the exportation of the papyrus from Egypt was prohibited by one of the Ptolemies, in order to throw an obstacle in the way of Eumenes, King of Pergamus, who endeavoured to rival him in the magnificence of his library. Most of the ancient manuscripts now extant are written on parchment, and scarcely any of them on the papyrus. There are to be seen, in some libraries on the continent, manuscripts written on a kind of parchment manufactured from the human skin; these manuscripts are supposed to come from Peru. Books have sometimes likewise been engraved or stamped upon lead, and written or printed on silk, linen, horn, vellum, and paper. The manufacture of paper is an invention of so late a date as the thirteenth or fourteenth century. The different materials which have been employed in this manufacture will be more properly described under the article PAPER. At present, we shall only observe, that the attention of the curious was long directed towards the discovery of a substance susceptible of writing, and proof against fire. Professor Burkman, of Brunswick, published a treatise on the manufacture of linen from asbestos, and is said to have caused several copies of his work to be printed on paper fabricated from linen of that description. Signior Castagnatta, too, in his account of the asbestos, proposes a scheme for making a book of so unperishable a nature, as to merit the appellation of the *Book of Eternity*. The leaves of this book were to be of asbestos paper, the covering of a thicker texture, but fabricated from the same substance, and the whole to be sewed together with asbestos thread. The contents of it were to be written in letters of gold, so that the whole materials, being not only incombustible, but proof against all the elements, must remain for ever undestroyed.

Different forms of books.

The form of books seems to have been originally square, to which we find frequent allusions in Scripture, under the appellation *sephir*, translated by the Septuagint αξινες, square tables. When they came to be written on flexible materials, they were rolled up in scrolls, called by the Greeks κεϊλακια, and *volumina* by the Romans. Only one side of the paper, or parchment, was written upon, and one sheet was always joined to the end of another, till the volume, or book, was finished, when it was rolled up on a cylinder, or staff. To each end of this stick was affixed a ball, or nob, which was employed as a handle for evolving the scroll. These balls were called *umbilici*, or *cornua*, and were generally made of bone, wood, or horn, and often carved and adorned with ivory, silver, gold, or precious stones. Only one book was included in a volume, so that a work generally consisted of as many volumes as books. On the outside was generally written the title, Συλλαβος.

In the Oriental countries, it is customary not only to roll up their books in the manner which we have described, but to wrap them in an elegant and costly covering, and to inscribe on the covering a title indicating the general tenor of their contents. This custom of writing on the outside of the covering of a book, or letter, has led Chrysostom to suppose, that, in the passage of the 39th Psalm, which our translators have rendered, "In the *volume* of the book it is written of me," the word translated volume was the wrapper in which the sacred book was contained; and that on this wrapper was inscribed a title, which signified "the coming of the Messiah." This interpretation suggests a much more distinct idea than the English word volume; for, as every Hebrew book was in reality a roll, or volume, the passage, according to our version, merely signifies, "In the book it is written of me." But, when we refer it to the case in which the book was inclosed, the expression becomes clear and energetic, implying, that the sum and substance of the sacred book is, that "the Messiah cometh;" which title might, with great propriety, be inscribed on the wrapper or covering of these sacred writings.

In another translation this expression is rendered ιν Ἰομω, which seems to intimate, that the motto was inscribed on the cylinder, round which books of the form we have been describing were rolled. In general, the cylinder extended far enough beyond the parchment, paper, or writing material, to exhibit conveniently, by a title, the general purport of the volume. In illustration of this idea, Mr Harmer, in the fourth volume of his *Observations on Scripture*, mentions a circle of gold, with the name of one of our Saxon princes inscribed upon it, and ornamented after the rude manner of those times, which, he supposes, might be designed to case the end of the cylinder, on which some book belonging to that monarch, or relating to him, was rolled. Of this ancient piece of gold there is an engraving in the seventh volume of the *Archæologia*, or *Transactions of the Antiquarian Society*. The square form, composed of separate leaves, which is now universal in Europe, is said to have been first invented by one of the kings of Pergamus; and soon came into general use. We are assured by Montfauçon, that, of the numerous Greek manuscripts which he had seen, only two were in the form of rolls, the rest were made up much in the same manner as modern books.

The internal arrangement of books has varied considerably in different countries, and at different periods. At first, the letters were only separated by lines, and it was long before their separation into individual words was even thought of. While this mode of writing prevailed, the utmost care was necessary to guard against errors; and accordingly we are informed, that the Rabbis, who were particularly anxious for the purity of the sacred text, knew the exact number of letters which a book contained. The inconvenience of this mode of writing suggested the division of letters into separate words; and the love of precision, by degrees introduced the practice of noting these words with accents, and distributing them, by different points and marks, into periods, paragraphs, sections, and chapters. In Hebrew, and other oriental books, the lines run from right to left; the Northern and Western nations write from left to right; the Greeks followed both directions alternately, going in the one, and returning in the other; in Chinese books, the lines run from top to bottom. The conclusion of a book was anciently marked with a figure ∠, called *coronis*; and the whole book was sometimes washed with cedar oil, or strewed between the leaves with citron chips, to prevent it from rotting. Certain formulæ were occasionally used at the beginning and end of books; thus we find, at the end of the books of *Exodus*, *Leviticus*, *Numbers*, *Ezekiel*, the word חיק, be courageous, as if to exhort the reader to persevere, and proceed to the following book. Books were often guarded, likewise, at the conclusion, with imprecations against such as should falsify them; as we find in the *Apocalypse*. It is with a similar view that the Mahometans place at the beginning of all their books the name of God, which is regarded with such profound reverence, as to afford the most certain protection to every thing on which it appears.

Before the invention of printing, and of the manufacture of paper from linen, books were so scarce and dear, as to be without the reach of all but persons of considerable opulence. Though the materials of which they were made had been as cheap and as plentiful as paper is at present, the labour of multiplying copies in manuscript would always have kept their numbers comparatively scanty, and their price high. Hence, in all the nations of antiquity, learning was almost exclusively confined to people of rank; and the lower orders were only rescued from the darkness of total ignorance, by the reflected light of their superiors, and raised above the rudeness of barbarism, by that partial improvement which men of cultivation and refinement necessarily impart, in a greater or less degree, to all within the sphere of their influence. The papyrus being the cheapest material for writing, was, of course, in most general use. But when the Saracens had conquered Egypt, in the seventh century, and the connection between that country and Europe was entirely broken off, the papyrus could no longer be procured, and books, already sufficiently rare, became now almost unattainable. Parchment, the only substance for writing which then remained, was so difficult to be procured, that it was customary to erase the writing of ancient manuscripts, to make room for some other composition. In this manner, many of the best works of antiquity were lost for ever; the noblest effusions of Cicero, or Virgil, might be exchanged for the barbarous jargon of a monkish declaimer; and the elegant and instructive narrations of Livy and Tacitus might be lost, for the superstitious detail of pretended miracles, or the legendary story of a saint. History records many facts which place in a very striking light the scarcity, and consequent value, of books, during the dark ages. Private persons seldom possessed any books at all; and even distinguished monasteries could, in general, boast of no more than a single missal. Towards the end of the seventh century, even the papal library at Rome was so poorly supplied with books, that Pope St Martin requested Sanctamand, bishop of Maestricht, to supply this defect, if possible, from the remotest parts of Germany. Nearly two centuries after, Lupus, abbot of Ferrieres, in France, sent two of his monks to Pope Benedict III. to beg a copy of *Cicero de Oratore*, and Quintilian's *Institutes*; "for," says the abbot, "although we have part of these books, there is no complete copy of them in all France." John de Pontissara, bishop of Winchester, on borrowing from his cathedral convent of St Swithins, at Winchester, (in 1299) a Bible with marginal annotations, in two folio volumes, gave a bond for the return of it, drawn up with great solemnity. For the bequest of this Bible, along with 100 marks, the monks were so grateful, that they appointed a daily mass to be said for the soul of the donor. To present a book to a religious house, was thought so valuable a donation as to merit eternal salvation; and it was offered on the altar with great ceremony. Books were sometimes given to monasteries, on the condition that the donor should have the use of them for life; and sometimes to private persons, with the special injunction, that they who received them should pray for the souls of their benefactors. The prior and convent of Rochester, threatened to pronounce every year the irrevocable sentence of damnation on the person who should dare to purloin or conceal a Latin translation of Aristotle's *Poetics*, or even obliterate the title. Roger de Insula, dean of York, presented several Bibles to the University of Oxford, in the year 1225, with this provision, that every student who perused them should deposit a cautionary pledge. So late as the year 1300, the library of that university consisted of only a few tracts, chained or locked in chests, in the choir of St Mary's Church. One of the statutes of St Mary's College, in Oxford, (1440) enacts, that no scholar shall occupy a book in the library more than an hour, or two hours at most, so that others shall be hindered from the use of the same. A more striking proof could not be adduced of the paucity of books which the library then contained. The celebrated library established by Humphrey, Duke of Glocester, in the same university, did not contain more than 600 volumes. In the beginning of the fourteenth century, the only classics in the possession of the University of Paris, were single copies of *Cicero*, *Ovid*, *Lucan*, and *Boethius*.

Their high price in the middle ages.

Some idea of the extravagant price of books in these ages of ignorance, may be formed from the following well authenticated facts: The *Homilies* of Bede, and St Austin's *Psalter*, were purchased, in the year 1174, by Walter, prior of St Swithins, at Winchester, from the monks of Dorchester, in Oxfordshire, for twelve measures of barley, and a splendid pall, on which was embroidered, in silver, the history of St Birinus converting a Saxon king. About the year 1400, a copy of John of Meun's *Roman de*

Book. *la Rose*, was sold before the palace gate at Paris for 40 crowns, or £33 : 6 : 6 sterling. For a copy of the *Homilies* of Haimon, bishop of Halberstadt, the countess of Anjou gave 200 sheep, five quarters of wheat, and the same quantity of rye and millet. When Louis XI. of France borrowed the works of Rhases, the Arabian physician, from the medical faculty at Paris, (so late as the year 1471,) he not only deposited by way of pledge a considerable quantity of plate, but was obliged to find a nobleman to join with him as surety in a deed, binding himself, under a great forfeiture, to restore it.

The manufacture of paper from linen, afforded such facilities for the multiplication of manuscripts, as produced a very great reduction in their price, and, of course, contributed essentially to the diffusion of knowledge. Learning had already begun to revive, and to be cultivated with considerable ardour, when the invention of printing, about the middle of the fifteenth century, gave a new stimulus to the human mind, and formed the most important æra to the history of literature and civilization. The power of increasing indefinitely the number of books, now placed them within the reach of persons of the most moderate fortunes; the avenues of science were thus thrown open to any one who had the curiosity to enter them; and its mysteries became accessible to all who had the perseverance to proceed. For some time after this happy invention, it was allowed to produce its natural effects; and the reading part of the community, delighted with the advantage of perusing their favourite authors at an easy rate, never thought of undervaluing a book on account of the facility of procuring it, as if learning could become less precious by being generally diffused. By degrees, however, the fastidiousness induced by plenty began to manifest itself, even in the appreciation of works of literature; the natural ambition of possessing what few could obtain, inspired the wealthy and the curious with a kind of contempt for books, however excellent in themselves, which were rendered common by their cheapness, and gave to others, which neglect or other causes had now rendered scarce, an adventitious value, often in inverse proportion to their intrinsic worth. Were the passion for rare books confined to those alone whose merit makes them desirable, it would be equally useful and respectable. But when it delights in raking up from just oblivion, at any trouble or expense, works which no man of taste or judgment would wish to open, it surely deserves no gentler appellation than drivelling and folly. That the majority of rare books are rare, only because they are destitute of merit, is obvious from this consideration, that new impressions of them would certainly have been printed, if there had been any hopes of their being sold; yet there are others, not so despicable, which particular circumstances have prevented from finding general circulation, and which, therefore, have become the objects of a very allowable, and even laudable curiosity. It may not be improper here to mention some of the causes of the scarcity of particular books; in enumerating which, we shall be led to relate some very curious facts in the history of modern literature.

Bibliographers have classed rare books under two general heads, those whose scarcity is *absolute*, and those of which the scarcity is only *relative*. Under the first head are comprehended,

Ca the scar part book

1. Books of which only a very small impression was originally printed, and of which the impression, from particular circumstances, could not be renewed. One of the Earls of Bute published a botanical work in eight volumes, with coloured plates, the impression of which he is said to have limited to twelve copies. Some additional copies, however, seem to have been surreptitiously printed; for one with uncoloured plates was lately offered to sale; for which, though imperfect, forty guineas were demanded. The twelve original copies were distributed as presents. In the year 1807, a work entitled *Views in Orkney*, by the Marchioness of Stafford, was printed for private distribution only. The large paper copies of the Grenville Homer were likewise intended solely as presents; and when they come accidentally to sale, are valued at one hundred guineas. The *Antichita d'Ercolano*, a splendid work in nine folio volumes, was printed at the expence of the King of Naples, and presented to illustrious individuals, or to distinguished literary bodies; and a translation of Sallust by Don Gabriel, one of the princes of Spain, and, we think, of the same family, was printed in a beautiful Italian character, and distributed in a similar manner. But none of these works can be compared with the *Museum Worsleyanum*, which consists of two large folio volumes full of engravings. It was printed in 1794, and the prime cost of each copy was estimated at £300 sterling. It was wholly disposed of in presents by its munificent author, Sir Richard Worsley. A small work entitled *Musæum Typographium*, was published by *Debure*, who is said to have limited the impression to twelve copies; and Fournier, a French bibliographer, printed only twenty-five copies of his *Essai Portatif de Bibliographie*.

2. The second cause of the absolute scarcity of books is, when they have been very rigorously suppressed. However we may regret any restrictions on the liberty of the press as unfavourable to the evolution of the human powers, and the progress of liberal knowledge, we must at least allow it to be natural for every government, to oppose the promulgation of any doctrines or principles which appear to have even the remotest tendency to undermine its civil or religious institutions. In our own country, works so directly subversive of every thing sound in policy, and sacred in religion, are published under the shelter of the freedom of the press, that we are sometimes tempted to wish for the interposition of the civil government to repress this licentiousness, till we are reminded, by the example of other nations, how fatally such interposition might tend to repress at the same time all free inquiry, and, instead of promoting the influence of morality or of genuine philosophy, to be perverted into the instrument of public oppression, or of private revenge. In the *Indices Expurgatorii* of Roman Catholic countries we see many books condemned, which contain such treasures of learning, and exhibit so enlightened and liberal views of every subject which they discuss, as command the admira-

tion of all the unbiassed and judicious. Who can hear, without emotion, that the works of such men as Linnæus, and our countryman Principal Robertson, men not more remarkable for the vigour of their genius, and the amplitude of their attainments, than for their sacred regard to religion, are prohibited on the continent, as dangerous in their tendency? The slightest appearance of contradiction, even though unintended, to the absurdities of a prevailing superstition, has often drawn down the weightiest vengeance on the unfortunate authors. A printer was beheaded in 1542, for the publication of a Dutch Bible. Papebroek, a learned Jesuit of Antwerp, was condemned by the Inquisition of Madrid, for advancing three heterodox assertions; first, that the Carmelite, or barefooted monks, were not descended from the prophet Elias; secondly, that the image of our Saviour was not impressed on the sacred handkerchiefs, and that doubts might be entertained whether there was actually a Saint Veronica; and, lastly, that the church of Antwerp was not, as it pretended, in possession of that corporeal evidence which proved the circumcision of Jesus Christ. After these examples of intolerance, we cannot be surprised that the truly exceptionable works of Voltaire should have been condemned and suppressed immediately on their publication; that the Emile of Rousseau was torn and burnt by the hands of the common executioners at Paris and Geneva; and that the same sentence was passed against the *Christianisme Devoilée* of Boulanger by the French parliament in 1770, and against the History of the East and West Indies by the Abbé Raynal in 1781. Even in the literary history of our own country, many instances occur of persecution equally unjustifiable against authors, whose publications have been offensive to church or state. William Prynne, the celebrated author of *Histriomastix*, a work levelled against the licentious amusements and practices which prevailed in the court of Charles I., was committed to the Tower of London in 1633, the year after its publication, and sentenced by the Star Chamber to pay a fine of £5000 to the king; to be expelled from the university of Oxford, and the Temple in Lincoln's Inn; to be degraded and disabled from practising his profession as a lawyer; to stand on the pillory; there to lose part of his ears; to have his book burnt before his face; and to be imprisoned for life. The execution of this severe sentence did not deter him from again exposing himself to the vengeance of the court, by the publication of another work, entitled *News from Ipswich*, which made its appearance in 1637. He was a second time sentenced by the Star Chamber to pay a heavy fine, to lose the remainder of his ears on the pillory, to be branded on both cheeks with the letters S. L. (Schismatical Libeller,) and to be perpetually imprisoned. This sentence was enforced in all its rigour; but when the government was overturned by the revolutionists, he was relieved by an order of the House of Commons in 1640; and twenty years after was himself elected a member of parliament. Neither prosperous nor adverse fortune, however, could check his propensity to expose and inveigh against what he conceived to be abuses; and he now published some reflections against the House; for which he was compelled to apologise. Woolston, the author of several controversial works in theology, was prosecuted in the Court of King's Bench, for the publication of the *Moderator and Apostate, with two Supplements.* At the solicitation of Mr Whiston, the attorney general then desisted from the prosecution. But when he published his *Six Discourses on the Miracles of Christ*, a new prosecution was commenced against him, and he was fined in £100, and sentenced to one year's imprisonment. Coward's *Thoughts on the Human Soul*, published at London in 1702, were condemned by parliament to be burnt by the hands of the common executioner, as containing doctrines hostile to the Christian religion; and the famous John Wilkes was expelled from parliament, in consequence of the publication of his North Briton, and Essay on Women. While the question of the expediency of a union between England and Scotland was keenly agitated, Atwood, an English lawyer, imprudently revived the obsolete dispute concerning the superiority of England over this kingdom. A treatise which he wrote on this invidious subject, was communicated to the Scottish parliament, who, with becoming indignation, condemned it to be burnt in Edinburgh by the common executioner. Works suppressed from such causes as these, often excite an interest which leads in time to their extensive circulation; but at all events, the original editions of them necessarily continue exceedingly rare; and when a portion of them has been destroyed, the scarcity must always remain. In some instances, the most rigorous suppression becomes not only justifiable, but indispensibly necessary, as in the case of works directly immoral, or of malicious libels calculated to ruin the character and the peace of individuals. Yet such is the perverseness of human nature, that such works are frequently read with an avidity exactly proportioned to the severity with which they are prohibited. Two volumes by Pasquill, published at Rome in 1544, are now very eagerly sought after, and bear an extraordinary price. They contain a number of epigrams in verse, and dialogues in prose, inveighing with much asperity against the government, and the conduct of private persons.

3. The next cause of the scarcity of books is, when, by particular accidents, they have been almost wholly destroyed. It is owing to a cause of this nature, that the *Atlantica* of Olans Rudbeck can scarcely be obtained complete; and had not some copies of the second part of the *Machina Cœlestis* of Hevelius been given to the author's friends, it would have been totally lost in the flames which consumed his house. A similar accident destroyed most of the large paper copies of Wakefield's *Lucretius de Natura Rerum*; in consequence of which those which were preserved are valued at sixty guineas each.

4. A fourth cause of the absolute scarcity of books is, when only part of them has been printed, the rest remaining unfinished. Cases of this kind too frequently occur, to require or to permit any particular enumeration. It necessarily happens when an author or editor, for want of encouragement, is unable to proceed with his work; and as none but an amateur of

rarities would take the trouble of rescuing such fragments from total destruction, these unfinished productions become, of course, the scarcest of books.

5. The next class of books which are absolutely scarce are, those which are printed on very large paper, or on vellum paper. The copies of a work printed on paper of this description, are in general very few, and their great expense would at any rate prevent them from becoming common. Strength and beauty of paper, and ample extent of margins, are qualities so much valued by some curious collectors, that they will scruple at no price to obtain them. A stern philosopher will be disposed to ridicule that taste which prizes a book merely for the blank space which it contains, and the size of the type, or the stiffness of the paper; and will be contented to enjoy the *accuracy* of a Grenville Homer for thirty shillings, leaving more wealthy or more passionate amateurs to pay 100 guineas for its greater magnitude, and more splendid dress. We should be little disposed, for our own parts, to regret or to censure this passion for royal paper, and wide margins, had it not become so fashionable among booksellers to publish every new work in this expensive manner, as if they wished those days to return when reading was the exclusive privilege of the opulent, and the repositories of learning remained shut against all who did not possess the golden key.

6. The next cause which we shall mention of the absolute scarcity of books is, their being printed on vellum, or any other substance besides paper. We have already mentioned some of the other materials employed for writing previous to the invention of printing, or in modern nations where the invention is unknown. Books formed of such materials must always be highly prized by the curious bibliographer, both for their great rarity and singular texture. Next to these in value, as well as in scarcity, are books printed in vellum, the expense of which is so great, that very few vellum copies of any work have ever been prepared. So far as we know, there is not a single instance of a whole impression of any work having been printed on this beautiful but costly substance. Hence books on vellum have generally been esteemed as the most precious treasures of a library; and there are instances of their being transmitted to successive generations, as one of the most important articles in a family property. One of the most beautiful specimens of vellum printing is a Roman breviary printed at Venice in 1478. It is a large folio volume, consisting of 401 leaves. The vellum is of the finest quality, thin and remarkably white, and the typography so smooth and well defined as to vie with the most beautiful impression from copperplate. It is printed in black and red ink, and decorated with splendid illuminations in gold, and different vivid colours; and with paintings of different animals. Whole pages occur in red ink, which has no gloss; but the black ink is extremely deep, and shines as if varnished. A few months ago, the Faculty of Advocates purchased a copy of this breviary for 100 guineas. Another very elegant work, of a similar description, entitled *Heures a l'usage de Rome*, was printed on vellum in 1507, or 1527. It is a small folio, consisting of 115 leaves, each page encircled by engravings on wood in great profusion, and, for the period of its appearance, extremely well executed. A work of Petanius was likewise published on vellum in 1610, consisting almost entirely of engravings, with a small portion of text on each plate. It is divided into two parts; the first, entitled *Supellectilis Portiuncula*; the second, *Veterum Nummorum*. Those works are necessarily so rare, that they are very seldom to be met with. But there are to be found in public libraries, as well as in private collections, copies of the classics printed on vellum, which are held in very high estimation. Most of these copies were printed on the continent in the fifteenth and sixteenth centuries. A specimen of this kind of typography, executed by Caxton, the first English printer, is to be seen in the king's library.

The practice of printing on vellum was almost wholly relinquished for many years, probably on account of its great expence; but was recently revived in several of the countries of Europe. Though modern works of this description are said to be inferior in beauty to those of greater antiquity, still they are very highly valued, and bring an extraordinary price. Goldsmith's and Parnell's Poems, and the Economy of Human Life, were printed on vellum in 1804, and sold for fifteen guineas each. Three copies of Lewin's British Birds were printed on vellum in 1796; one of which the author tore to pieces in a frenzy of passion, and each of the remaining two was sold for 140 guineas. This kind of printing seems to have been introduced into our native country at a very early period. So far back as the year 1536, Bellenden's translation of Hector Boethius's History of Scotland was printed on vellum, in a folio of 250 pages. Four copies of this work are known to exist in Scotland; one in the university of Aberdeen, another in that of Edinburgh, and two in the possession of private individuals. Vellum printing was revived in Edinburgh in 1809, when a beautiful specimen was produced in a small volume called *Monastic Antiquities*. M. Van Praest is now engaged in framing a list of all the works that have been printed on vellum, of which he has been able to enumerate above 2000. For farther particulars respecting the different materials of which books have been made, and the various styles of printing them, we must refer to the articles PAPER and PRINTING.

We cannot let slip this opportunity, however, of mentioning a very remarkable book, neither written nor printed, entitled, *Liber passionis Domini Nostri Jesu Christi, cum figuris et characteribus nulla materia compositis.* For this very singular bibliographic curiosity, Rodolphus II. of Germany offered 11,000 ducats, in the year 1640. It consists of the finest vellum; the whole letters of the text are cut out of each folio; and, being interleaved with blue paper, it is as easily read as if it had been printed. It lately belonged to the family of the Prince de Ligne, and is at present in France; but as it bears the royal arms of England, it appears extremely probable that it is an English production.

The last description of books which are absolutely scarce, are manuscripts, written either before or after the invention of printing. Such original manuscripts form the chief riches of libraries. They are generally written on vellum; and, independent of their antiquity and rarity, cannot fail to be prized for the miniatures and golden letters with which they are adorned, and the excellent order in which they are preserved.

Under the second class, or books of *relative* scarcity, are comprehended such as excite little interest, or are too extensive for the purchase of individuals. Under this head, therefore, we may class, 1. Great works, such as the *Acta Sanctorum*, the *Councils*, the *Grand Library of the Fathers*, the *Bibliotheca Maxima Pontifica* of Rucaberti, and the *Gallia Christiano*, and others of a similar description. 2. Fugitive pieces, the interest of which dies with the occasion which gave them birth. 3. Histories of particular towns, which can be valued properly by the inhabitants alone. 4. Histories of academies and literary societies, the subject of which is too particular to excite general attention. 5. Lives of learned men, which, like other private histories, excite only a partial and transient interest. 6. Catalogues of public and private libraries, which can be valued only by those who have access to them, and of which, in consequence, only a few copies are printed. 7. Books of pure criticism, which, as they suit the taste of critics alone, who form but a very small proportion of the reading world, are scattered into different countries, and at last become very rare. 8. Books of antiquity, which, being generally adorned with numerous plates of urns, statues, medals, &c. are at first exceedingly expensive, and cannot be reprinted without much difficulty. 9. Books which treat of the curious arts, such as music, painting, and sculpture, which are suited to the taste only of artists or amateurs, among whom, when they are once dispersed, they cannot easily be recovered. The 4th volume of *Bibliotheque des Philosophes Alchymiques ou Hermetiques*, in 12mo, is now so rare, that it is sold for sixty French livres. The cause of this scarcity is, that a thousand copies were printed of the three first volumes, and only five hundred of the fourth. 10. Books written in languages little known, or those whose style is caricatured, or intentionally corrupted.

Particular editions of books likewise acquire great value for their relative scarcity. Of this kind are, 1. Editions printed from ancient manuscripts. 2. The first edition printed in a particular town. 3. Editions which have issued from the presses of celebrated printers. 4. Editions distinguished by any peculiar and extraordinary letters or characters. 5. Editions published in foreign countries. 6. Editions which have never been exposed to sale. 7. Editions which have been sold under different titles. To what an enthusiastic height some bibliographers have carried their fondness for early editions, the following facts will most strikingly illustrate. Ten guineas were paid for four odd leaves of an early edition of some of the works of Cicero. A first edition of Suetonius is valued at 100 guineas, and the Florentine Homer was recently purchased for £95 sterling. The Mazarine Bible was sold in Edinburgh, in 1806, for 150 guineas; and the first edition of Shakespeare, published in 1623, is valued nearly as high.

Book,
Book-binding.

For further particulars on the subject of books, the reader may consult Peignot, *Dictionnaire Raisonnè de Bibliologie*, 3 tom. Peignot, *Dictionnaire des principaux livres condamnès au feu supprimes ou censures.* Peignot, *Essai de Curiosites bibliographiques. Dictionnaire Bibliographique*, 4 tom. Paris, 1790—1802. Fournier, *Nouveau Dictionnaire Portatif de Bibliographie.* Clarke's *Bibliographical Dictionary*, Barbier, *Dictionnaire des ouvrages anonymes ou Pseudonymes.* Miglius et Stollius, *Bibliotheca anonymorum et pseudonymorum.* Clement, *Bibliotheque des livres difficiles a trouver.* Haym, *Bibliotheca Italiana.* Debure, *Bibliographie Instructif.* Bandini, *Catalogus Codicum bibliothecæ Mediceæ Laurentianæ.* Heineker, *Idée generale d'une collection d'Estampes.* Panzer, *Annales Typographici.* Mattaire, *Annales Typographici.* Meerman, *Origines Typographici.* Brandolese, *Serie dell' edizione Aldine.* Renouard, *Annales de l' imprimerie des Aldes.* Audiffredi, *Catalogus Romanarum editionum seculi* xv. Harwood, *View of the various editions of Greek and Roman Classics.* Dibdin, *Introduction to the rare and valuable Greek and Latin Classics.* Amos and Herbert, *Typographical Antiquities of Great Britain and Ireland.* Salden, *De usu et abusu librorum.* Bartholinus, *De Libris legendis.* (*c*) (*k*)

BOOK-BINDING, the art of sewing together the sheets of a book, and securing them with a back and side boards. Binding is distinguished from *stitching*, which is merely sewing the leaves, without bands or backs; and from *half binding*, which consists in securing the back only with leather, the pasteboard sides being covered with blue or marbled paper; whereas, in binding, both the back and sides are covered with leather.

At what time the art of book-binding was first invented it is impossible to ascertain; but Phillatius, a learned Athenian, was the first who pointed out the use of a particular kind of glue for fastening the leaves of a book together; an invention which his countrymen thought of such importance as to entitle him to a statue. The most ancient mode of binding consisted in gluing the different leaves together, and attaching them to cylinders of wood, round which they were rolled. This is called Egyptian binding; and continued to be practised long after the age of Augustus. It is now wholly disused, except in oriental countries, and in the Jewish synagogues, where they still continue to write the books of the law on slips of vellum sewed together, so as to form only one long page, with a roller at each extremity, furnished with clasps of gold or silver. The square form of binding which is now universally practised, at least in Europe, is said to have been first invented by one of the kings of Pergamus, the same to whom we owe the invention of parchment. See BOOK.

Book-binding, according to the present mode, is performed in the following manner:—The sheets are first folded into a certain number of leaves, according to the form in which the book is to appear; viz. two leaves for folios, four for quartos, eight for octavos, twelve for duodecimos, &c. This is done with a slip of ivory or boxwood, called a folding stick; and in the arrangement of the sheets, the workmen are directed by the catchwords and signatures at the bottom of the pages. When the leaves are thus folded

Book-binding.

and arranged in proper order, they are beaten on a stone with a heavy hammer, to make them solid and smooth, and then they are pressed. After this preparation, they are sewed in a sewing press, upon cords or packthreads called bands, which are kept at a proper distance from each other, by drawing a thread through the middle of each sheet, and turning it round each band, beginning with the first and proceeding to the last. The number of bands is generally six for folios, and five for quartos, or any smaller size. The backs are now glued, and the ends of the bands are opened, and scraped with a knife, that the pasteboard sides may be more conveniently fixed; after which the back is turned with a hammer, the book being fixed in a press between boards, called backing boards, in order to make a groove for admitting the pasteboard sides. When these sides are applied, holes are made in them for drawing the bands through; the superfluous ends are cut off, and the parts are hammered smooth. The book is next pressed for cutting; which is done by a particular machine called *the plough*, to which is attached a knife. It is then put into a press called the cutting press, betwixt two boards, one of which lies even with the press, for the knife to run upon; and the other above, for the knife to cut against. After this, the pasteboards are cut square with a pair of iron shears; and, last of all, the colours are sprinkled on the edges of the leaves with a brush made of hog's bristles; the brush being held in one hand, and the hair moved with the other.

Different kinds of binding are distinguished by different names, such as *law binding*, *marble binding*, *French binding*, *Dutch binding*, &c. In Dutch binding, the backs are of vellum. In French binding, a slip of parchment is applied over the back between each band, and the ends are pasted on the inside of each pasteboard. This *indorsing*, as it is called, is peculiar to the French binders; who are enjoined, by special ordonnance, to back their books with parchment. The parchment is applied in the press, after the back has been grated to make the paste take hold. The Italians still bind in a coarse thick paper, and this they call binding *alla rustica*. It is extremely inconvenient, as it is liable to wear without particular care.

A patent was obtained in 1799, by Messrs John and Joseph Williams, stationers in London, for an improved method of binding books of every description. The improvement consists of a back, in any curved form, turned a little at the edges, and made of iron, steel, copper, brass, tin, or of ivory, bone, wood, vellum, or in short of any material of sufficient firmness. This back is put on the book before it is bound, so as just to cover without pressing the edges; and the advantage of it is, that it prevents the book, when opened, from spreading on either side, and causes it to rise in any part to nearly a level surface. In this method of binding, the sheets are prepared in the usual manner, then sewed on vellum slips, glued, cut, clothed, and boarded, or half boarded; the firm back is then fastened to the sides by vellum drawn through holes, or secured by inclosing it in vellum or ferret wrappers, or other materials pasted down upon the boards, or drawn through them.

A patent was likewise obtained in 1800, by Mr Ebenezer Palmer, a London stationer, for an improved way of binding books, particularly merchants account books. This improvement has been described as follows: Let several small bars of metal be provided about the thickness of a shilling or more, according to the size and thickness of the book; the length of each bar being from half an inch to several inches long, in proportion to the strength required in the back of the book. At each end of every bar let a pivot be made of different lengths, to correspond to the thickness of two links which they are to receive. Each link must be made in an oval form, and contain two holes proportioned to the size of the pivots; these links to be of the same metal as the hinge; and each of them nearly equal in length to the width of two bars. The links are then to be rivetted on the pivots, each pivot receiving two of them, and thus holding the hinge together, on the principle of a link-chain or hinge. There must be two holes or more of different sizes, as may be required, on each bar of the hinge or chain; by means of these holes, each section of the book is strongly fastened to the hinge, which operates with the back of the book, when bound, in such a manner as to make the different sections on a parallel with each other, and thus admit writing without inconvenience on the ruled lines, close to the back.

The leather used in covering books is prepared and applied as follows: Being first moistened in water, it is cut to the size of the book, and the thickness of the edge is pared off on a marble stone. It is next smeared over with paste, made of wheat flour; stretched over the pasteboard on the outside, and doubled over the edges within. The book is then corded, that is, bound firmly betwixt two boards, to make the cover stick strongly to the pasteboard and the back; on the exact performance of which, the neatness of the book in a great measure depends. The back is then warmed at the fire to soften the glue, and the leather is rubbed down with a bodkin or folding stick, to set and fix it close to the back of the book. It is now set to dry, and when dry the boards are removed; the book is then washed or sprinkled over with a little paste and water, the edges and squares blacked with ink, and then sprinkled fine with a brush, by striking it against the hand, or a stick; or with large spots, by being mixed with vitriol, which is called marbling. Two blank leaves are then pasted down to the cover, and the leaves, when dry, are burnished in the press, and the cover rolled on the edges. The cover is then glazed twice with the white of an egg; then filleted, and last of all polished by passing a hot iron over the glazed colour. For farther information on book-binding, see Dudin, *Art du relieur doreur de livres*. *Encyclopedie Méthodique*, art. RELIEUR. Williams's *Patent for Bookbinding*, in the *Repertory of Arts*, vol. xiv. p. 89. Palmer's *Patent for binding Books with Hinges of Metal*, in the *Repertory of Arts*, vol. xiv. p. 305; and Hardy's *new Cutting Press for Bookbinders*, in the *Transactions of the Society for the Encouragement of Arts*, &c. vol. xxiv. p. 116. (*k*)

BOOK-CASES. An account of a new and improved bolt for book-cases, invented by Mr Herbert, will be found in the *Transactions of the Society for the Encouragement of Arts*, vol. xxiii. p. 313. (*w*)

BOOK-KEEPING.

Book-Keeping, is the history of public or private property in all its changes; and of the causes of these changes, and of the increase or decrease of property following from them.

The general history of property, written in the order of time, is called the *Waste-book*: When written specially to point out the causes of the changes, it is called the *Journal*: When the particular parts of each transaction, separate from each other in point of time, are collected together in the great book, the *Leger*. They also form a general history, but of a nature different from the two former.

The Grecian history has left us a memorial of great anxiety about public accounts in Pericles, who was admonished by Alcibiades not to trouble himself about them; and in the person of Augustus, who presented the state of the nation (*Rationarum, Suet. in Aug.* c. 28.) to the magistrates and senate assembled in his own house to a committee of accounts.

The Grecian and Roman languages furnish also the names used in the arrangement: *Diploma*, a grant; *syngraphum*, a bill; *gramma*, a note; *cautio*, a note; *tabulæ*, the entire account; *magnus liber*, the Leger; *tempus venale*, the day of sale; *sanguinolentæ centesimæ*, —— usury, (Seneca, *De Benef.* lib. vii. cap. 10.); and *utraque pagina*, debtor and creditor, (*Pliny*, lib. ii. cap. 7.)

The slaves formed a great part of the population of the Roman world; they were employed on the farms, and in the work-houses, which were manufactories; their maintenance, and rewards (*peculium*), were certainly valued by their labour; these farms extended nearly over entire provinces; these work-houses were as large as cities; and these slaves were as numerous as warlike nations (Seneca, *Ibid.*); and all these were under the controul, and for the advantage, of individuals in a private station, who diligently and eagerly examined the great book. (Seneca, *Ibid.*)

Notwithstanding this, there is no method by which it can be ascertained, whether their accounts were kept by a general history in the order of time, or by the particular history of each article, as those do now who are not acquainted with the art. No book, or part of a book of this kind, has been preserved during the revolution of the Roman world.

The cities of Italy in the middle ages raised themselves to power by commerce. In the time of the crusades, they were not only carriers, but also contractors. The Venetians felt the effects of the league of Cambray in the beginning of the 16th century. It was after this period that the system of book-keeping, the appendage of commerce, became known in England. Hugh Oldcastle published his work in 1543, and John Peile in 1569. These and their successors laboured only to settle the forms of words in the two Day-books, leaving the Leger without an absolute rule, (§ 28. 51.) Nothing more was done even on the Continent. Mr Macolm at length published his work; wherein he shewed by example, that the writing of the titles of the Leger accounts in a margin of a third of the page to the left of the entry of the Waste-book, was a sufficient preparation for the Leger; because the original entry was in the view of the book-keeper: thus the full half of the former labour was saved. Mr Ephraim Chambers (edit. 1738) strongly recommended this practice; but few followed this good example. Even the most popular of the present writers, Mr Kelly, has not thought proper to recommend it.

Macolm's improvement.

Mr Jones's system of balance in the Day-books.

Transferring the accounts from one book to another, and thus making three fair copies of the same transaction, one in the Journal, and two in the Leger, produced a great degree of weariness and inattention, and of course mistakes. The balancing of the Leger was a most serious undertaking, and seldom successfully accomplished; and even then, it could not be proved to be an exact transcript of the Day-books. To remedy this, Mr Jones of Bristol, an accountant by profession, in 1796, published a work, to shew a method of forming a balance-sheet in the Day-books. For this purpose he used a Day-book for the entries of personal and cash accounts, and another for the entries of goods, with their prices; but without any reference to the personal or cash accounts, but by the dates. The personal and cash accounts were respectively entered in the marginal columns; and their total were to be the same as the general column of entry, which was placed near the creditor marginal column. With this preparation he set out; and having collected the balances of goods, added the total to the debtor column of the cash and personal accounts, and truly prepared for the answer, according to *the examples* given. The proposal and book were received with an eagerness which manifested the anxiety of the mercantile world. Mr Jones failed, because he did not understand the language of the art; because he did not know the only difference which exists between the two orders of accounts, of those which have inner columns and of those which have none; and because he did not observe how these two orders of accounts concur to form the balance-sheet in the Leger. The reviewers (*Analytical Review*, 1796, April) equally shewed their want of information on the subject, when they spent their time in refuting his phantom of single entry; and by asserting, that nothing was gained by the system if it were double entry. They did not observe the omission of all those accounts, which, by having inner columns, could not be introduced into his plan. A later writer has asserted, that the detection of an error decided the controversy. Mr Jones' examples could admit but a clerical error. The principle must hold: but Mr Jones' plan failed, because there could be no reference to the accounts of goods; because no entry could be made of those acquired by barter, nor of accounts between employers and factors, nor between dealers in exchange; and especially

His failure in the attempt.

By omitting the only difficulty in his own examples.

because he omitted the only difficulty which can occur in balancing a set of personal and cash accounts. This happens when the merchant lessens his debt by anticipated payment; for this an allowance is made to the merchant, which truly alters the correspondent creditor side of the account, (See Jan. 27.) and must be taken off by some title: discount is the one chosen in the following system. Two entries are made there, to explain the principle. The one for notes payable could only be introduced by the author in his original work.

The new system of balance in the Day-books.

At length a true and correct system of balance in the Day-books was published September 1809, in Dublin. The experiment of its utility was tried on a very popular work, known by the title of *The System of Italian Book-keeping*, by the Rev. Daniel Dowling. The trial shewed immediately the only error in the Leger of that work, which had crept in by the mistake of a pretender to the knowledge of the plan of double entry; and it also shewed two errors in the copy of that work published with the name of Mr Jackson, for which there could be no remedy but by single entry; which is out of the plan

The Leger balances must be equal to those in the Day-books, part by part.

Thus the only point which remained to be attained to complete the system is now in existence; and an easy and true criterion is presented to the merchant, to enable him to prosecute his business without waiting for the tedious operation of distributing and closing the accounts in the Leger; and the book-keeper is consoled, by shewing, that his balances in the Leger are the same, part by part, with those in the Day-books. See *Balance-sheet.*

An index for the personal accounts in the Day-book.

An index for the personal accounts, formed like the index of the letter-book, will enable the book-keeper to make out all personal accounts and bills of parcels, in a more easy manner than can be done while the Leger is kept in the abridged form in which it appears in the printed systems.

Several Day-books are necessary for extensive business.

In houses of very extended business, it is necessary to have two or three Day-books, that the clerks of the sales may not be interrupted in making their entries by the interference of the book-keeper, as a

Book A. for Monday and Thursday;
Book B. for Tuesday and Friday;
Book C. for Wednesday and Saturday.

CHAP. I.

Nature of Book-keeping.

Nature of Book-keeping.

1. Every transaction of mercantile business consists of two parts,—the giving of one thing for another. This giving away and receiving are two different relations, each of which requires its distinct entry, to shew the change of property; and thus,

2. Book-keeping is the art of keeping accounts by double entry.

3. It consists, *first*, In the method of recording the transactions in the several books; *secondly*,

4. In transferring the accounts from one book to another; and, in some, from a particular account to a general account; *thirdly*,

5. In the method of finally ending each account; commonly called, closing the account.

6. The whole of property is distributed into,

Money, Wares, Paper effects, Single effects,	Debts due to the merchant, or by him. Engagements.

7. And this entire property is generally expressed by the word, Stock; which means, fixed at the disposal of the owner, and liable to all claims on him.

8. The ordinary means of acquiring property being by barter or service, the word *transaction*, which expresses the giving away, is applied to all mercantile business, and the detail is as follows:

9.	Receiving, Paying, Lending, Borrowing, Lodging, Drawing,	Money.	
	Buying, Selling, Bartering, Consigning, Receiving consignments of, Making or receiving, Abatements for defects in,	Wares.	
10.	Issuing, Accepting, Drawing, Remitting, Protesting,	Bills.	
	Paying protested bills, for the honour of the drawer.		
	Receiving or paying bills, with discount.		
11.	Issuing or receiving bonds.		
	Lending, Borrowing,	on bottomry, or at interest.	
12.	Buying, Selling, Freighting, or letting to freight,	Ships.	
	Buying, Selling, Letting,	Houses and Lands.	
13.	Assigning, Counterbalancing, Discounting,	Debts.	Active due to the merchant. Passive due by the merchant.
14.	Giving or receiving security for old debts.		
15.	Making conditional bargains.		
	Making or receiving presents.		
	Finding or losing.		

CHAP. II.

Principal and Auxiliary Books.

16. 1st, The Waste Book.
2d, The Journal.
3d, The Leger.

17. The Auxiliary Books are,

1st, The Cash Book.
2d, The Bill Book.
3d, The Invoice Book.
4th, The Sales Book.
5th, The Book of Accounts-current.
6th, The Book of Commissions.
7th, The Book of Charges.
8th, The Copy Book of Letters.
9th, The Book of Postage of Letters.
10th, The Book of Ships Accounts.
11th, The Receipt Book.
12th, The Pocket Book of Memorandums.

18. The Book of Accounts-current,
The Book of Commissions,
The Book of Charges,
The Copy Book of Letters, and
The Receipt Book,

are so useful, that they are introduced into every office.

19. The method of arrangement in the auxiliary books, depends on the rules in the principal books; therefore, the forms of these are the first to be explained.

CHAP. III.

The Waste-book.

Waste-

20. The Waste-book is a Day-book, in which the several transactions which occur are recorded in the order of business, and in the most plain language.

21. It begins with an inventory of the whole property of the merchant, authorised by his name.

The circumstances to be mentioned are,

1st, The date.
2d, The part of the transaction that belongs to the merchant.
3d, The person.
4th, The payment.
5th, The quantity and quality, mark, &c.
6th, The price.

22. It is ruled with three columns to the right, for £. *s. d.*; one to the left, for a margin; to which it is convenient to add another inner column, pencilled and parallel to the margin, at the distance of four letters, to regulate the beginning of the lines specifying the quantity and quality.

23. The entries are to be made on the left hand page throughout this book. Particular care is to be taken, that no space be left at the bottom of the page to introduce a new article; and that no article shall be inserted near the bottom of the page, unless it can be fully entered in it: otherwise, the space must be occupied by a diagonal line.

24. The date is in the centre, and ink lines are drawn from it to the perpendicular lines, in every transaction.

25.

——*January the* 1*st*, 1807.——	£.	*s.*	*d.*
Bought of A. B. for ready money,			
40 pieces of linen cloth at £3 ⅌ piece	120	0	0

CHAP. IV.

The Journal.

26. The Journal is a Day-book, in which the two parts of every transaction of the Waste-book are ascertained by their proper titles, and by their mutual relation of debtor and creditor in the transaction, to be brought to their separate accounts in the Leger. The Journal.

Hitherto this was made a separate book, and was ruled in the form of the Waste-book.

27. In the present system, the right hand page of the Waste-book is divided into two equal spaces from the top to the bottom of the page, with money columns in each; and the titles belonging to each part of the transaction are written in a protracted horizontal line, with their corresponding expressions in the Waste entry, either in the column to the left, called the debtor column, or in the column to the right, called the creditor column, according to the nature of their relation to each other. Each division is to have a margin for a reference to the Leger, by a single figure, which points out the folios of the Leger, when these accounts have no entry in the Numero-book; but when they have, a fractional expression is used, and the numerator points to the Leger, and the denominator to the Numero-book. Each title is written in a large and thick letter.

28. By ascertaining the titles, and their relation to each other, the articles are sufficiently prepared for the Leger, and for the novel purpose of a balance by the Day-books. The narrative of the Journal entries become useless, because the original entry is in view on the left hand page; and because these entries, which are in five different forms, never can give one precise rule for the narrative of the Leger: They most commonly apply to the debtor entry, and but in one case to the creditor entry; whereas these two parts have always separate and distinct forms of narrative in the Leger, appropriate to their titles, except in the conjunction of some personal and real accounts; as will appear in the direction to be given for the narrative of the Leger; an instruction which has been omitted by the several writers on this subject.

29. The titles of the accounts are so well arranged, and so brief, that they not only express the object of the transaction, but also the relation in which it stands to the person who conducts it; thus, the titles are first divided into the classes of *real, personal, intermediate*, or *summary*; and, since these accounts may be for the sole benefit of the conductor, or for the benefit of another, or for himself and another, they are divided into

Proper	which are called	the first set;
Factorage		the second set;
Company		the third set.

30. For the understanding of the relation which the parts of the transaction bear to each other, marked by the words debtor and creditor, it is necessary to observe, that the entry of the Waste-book is (ac-

cording to the language of grammar) in the active form without any abbreviation, as I bought one hogshead of sugar for ready money:

While the entries of the Journal and Leger are in the passive form, accompanied with a considerable corruption of a word derived from the Latin language, and also an abbreviation.

31. The word debtor is corrupted from *debitur*, the passive form of the obsolete verb *debio*, to bind, agreeing with the title (Lennep, *Latin Etymology* v. *debio*) and in like manner creditor is corrupted from the compounded passive verb *creditur*: this is formed from do.—to give—and the participle *cretum* separated, as meal by a sieve, (Kuster, v. *Cerno*) this analysis is plainly proved by the English phrase connected with these Latin words; thus,

The thing received is bound-to, or connected with the thing given for it in barter. One kind of wares is connected with another, or with the person who sold it in trust.

But the manner of the connection is to be supplied by the mind. In this sentence, the figs came from Turkey to London; the word *from* shews the beginning of the journey, and the word *to* marks its termination: the same word *to* must also be used to mark every part of the progress of the journey: as first to Malta, then to Gibraltar, to Falmouth, to London: in the same manner the word *to* in this art marks every person with whom (whether owner, factor, or partner factor,) and also every property with which the buyer, borrower, or broker, may be connected from the commencement to the end of the mercantile transaction.

The expression is then: These wares stand me in ten pounds: that is, stand to me in the place of ten pounds given for them; the word cost being formed from the Latin verb *consto*, to stand with. The wares were connected with the ten pounds as a barter, before they were connected with me as the owner, or on the behalf of the owner. This shews the reason of the abbreviation of the Journal and Leger forms. The thing given for another is separated from its account, from the property and the cause of the separation is expressed and accompanied with the word *by:* to which, whenever it is used in the passive form, the mind must connect, either agent, instrument, or cause.

This word *by* is no other than the word *be* in the imperative mood; and be cash the cause, is of the same import, as *by cash*. See *Diversions of Purley*, vol. i. p. 402.

32. By this statement it will appear, that the words Debtor and Creditor have but one uniform meaning in the whole system, that is,

Debitur is bound to or connected with the thing given for it, or the person who gave it.	*Creditur* is separated from its account by the thing received, or the person released.
Connected with an error.	Separated by an error.
Connected with a new account or folio, whether particular or general.	Separated by a new account or folio, whether particular or general.

33. The articles of real accounts, when connected with each other, shew instantly a barter, or exchange; personal accounts, when connected with each other, shew mutual claims and releases. Personal accounts, when connected with real accounts, shew claims or releases substituted for barter.

34. There are besides titles of accounts to record the general state of property.

1st, At the commencement of business, and also the receiving or giving away any property for any cause not connected with a real or personal account, service, or engagement.

2d, In its progress by service or engagement.

3d, The profit and loss arising from the purchase and sale of commodities in the respective and particular account of each article.

Although all these may be entered in one general account, titled Stock, merchants have commonly separated them into six, which have titles in the Journal and Leger.

35. There is as yet a seventh general account, called Balance, which has hitherto been peculiar to the Leger; but can be formed with more ease and certainty in the Day-books.

36. *The Journal Titles of Real Accounts which are to be kept in the Leger.*

Money.	Ready money & Bankers Notes.	Cash.	Proper.
Wares.	In the Merchant's possession for his own account.	Wares by name as Claret. Linen cloth.	P.
Wares.	Bought for expertation.	General account of wares.	P.
	Consigned to another for the Merchant's account.	Voyage to -	P.
	Consigned by a Factor to another for the Merchant's account.	Voyage from to	E. P
	In the possession of the Merchant for the account of another.	A. B. his account of wares.	Factorage.
	Under his direction for himself and others.	Claret in Co. with A. B. &c.	C. F.
	Under the direction of another for a joint account.	Adventure in Co. with C.D. & Co.	E. C.
Paper Effects.	Bills or promissory notes payable to the Merch.	Bills and notes.	P.
	The Merchant's accept. or notes.	Bills or notes payable.	P.
	Contracts for money lent to fit out ships, and payable on their safe arrival.	Bottomry.	P.
	Bonds for money lent.	Bonds.	P.
	The Merchant's bonds.	Bonds payable.	P.
Single Effects.	Ships.	Ship (by name)	P.
	Houses and lands.	House and lands in the county of	P.
	House furniture.	Moveables.	P.

37. *The Journal Titles of Personal Accounts.*

1st, A common personal account.	A. B.	P.
2d, An account of the merchant's affairs done by another.	A. B. my account.	P. E.

3d, An account current of the affairs of another done by the merchant.	A. B. his account.	F.
4th, Do. for a joint account.	A. B. his account in Co.	C.
5th, Do. for a joint account of Exchange in Co.	A. B. our account of exchange in Co.	C.
6th, Do. do. with a factor.	A. B. our account for Co.	E. F. C.
7th, Several debtors for small sums.	General account receivable.	P.
8th, Several creditors for small sums.	General account payable.	P.

38. *The Journal Title of intermediate or summary Accounts are,*

1st, The state of the merchant's property at the commencement, or at the closing of accounts, and every increase or decrease of his property in the intervening time, without giving a valuable consideration of property for such increase, or without receiving a valuable consideration for such decrease	Stock.
2d, Gains or losses by business . .	Profit and loss.
3d, Expenses of business by housekeeping, servants, rent	Charges.
4th, Gain or loss by transacting business for another	Commission.
5th, Gain or loss by lending money	Interest.
6th, Gain or loss by insuring for others	Insurance.

There is besides another Summary Account hitherto peculiar to the Leger.

1st, Balance the difference between the inner columns of the real accounts, and of the inner columns of the factor's accounts in foreign money, and also of factor's accounts of domestic money, attended with exchange, and the difference between the two sides of personal accounts, except the single case of insolvency.

39. For the ready management of those titles, the following rules have been contrived :

A Real Account is

Dr.	*and Cr.*
When it becomes mine, To the Thing, Person, Service, Engagement,	
The cause or occasion of this for its value, or its improvement.	When it ceases to be mine, By the Thing, Person, Service, Engagement; Which is the cause of this separation, and produced by it.

A Personal Account is Dr.	*and Cr.*
When he gets into my debt.	When he gets out of my debt.
For what he then contracts.	By what he pays or ceases to owe.
When I get out of his debt.	When I get into his debt.
To the Thing, Person, Service, Engagement, The cause or occasion of it.	By what he gives me.

A Summary Account.

When Dr.	When Cr.
And connected with a real or personal account implies a loss.	And connected with a real or personal account implies a gain.

There are also three Maxims.

FIRST MAXIM.

40. When the summary accounts are debtors, and thus the cause of the separation of some real or personal account, there is a loss ; this is true, but in a secondary consideration : the immediate value of the title, and not the form of the entry, proves the rule ; for, if a personal account be insolvent, or wares be damaged, a loss is incurred as certainly as by any of the summary accounts.

SECOND MAXIM.

41. To take off a debit, credit the account *by* so much ; to take off a credit, debit the account *to* so much ; the relative value of either side is changed by the equivalent addition, and thus all erasure in the book is avoided.

THIRD MAXIM.

42. To carry a debit from one folio to another, make the former creditor and the latter debtor. To carry a credit from one folio to another, make the former debtor and the latter creditor. This maxim is but a consequence of the second, and the truth of both depends on the meaning of the words debtor and creditor.

CHAP. V.

The Leger.

The Leger.

43. The Leger is a book into which the several transactions which are dispersed in the Waste-book and auxiliary books, and prepared by the Journal entries of the titles, with the relation of debtor and creditor, are transferred each to its proper account.

44. By this arrangement, the merchant readily perceives by the inner columns the true state of each real account in respect to the quantity remaining, and by the inner columns of those personal accounts which have them, what he owes, or is due to him ; and by the outer columns of the other personal accounts, what is due to him, or what he owes ; and in respect to the summary accounts, the state of the

property at the commencement, and any gain or loss not arising from business, service, or engagement.

45. But, to know the total state, another operation is necessary, called the Balancing of the Books, which is done by forming a balance sheet; this has hitherto been confined to the Leger; its nature, and check in the Leger, will be explained in Chap. VII. § 73.

46. The accounts in this book consist of two parts; the two pages of the book, as it lies open, belong to the same account; that to the left is called the Debtor side, that to the right the Creditor side.

47. The debtor side is opened by the title of the account, and the word debtor, and the creditor side, thus,

Claret, *Dr.* *Contra*, *Cr.*

48. The accounts are opened in it in the order in which they are in the Journal; and are transferred to it by the direction to the marginal reference in the page of the Leger, in which the debtor and creditor titles respectively are, § 27.

49. This book has an alphabet for all the accounts: Each kind of wares is classed by its name; each general title by its name; and each person by the sirname, with the Christian name annexed.

50. It is ruled with three columns to the right side of each page, and immediately to the left of these with a column of reference to the correspondent folio of the Leger.

And next are the inner columns respectively for

Marks,
Quantity,
Foreign money,
Domestic money attended with loss and gain,
The sum specified in bills and notes, and day of payment.

It is ruled on the left side of each page with a line, which, with the margin, leaves a space for the name of the month, and a line to leave a space for the day of the month.

To which it will be convenient to add another line for the Journal folio page in which the transaction was entered; it is obvious, that the transactions of an extensive business may occupy several folios; in any other case, the day of the month will answer.

51. The circumstances to be entered on the respective side of the two titles, when there is but one debtor and one creditor, or on the respective side of the titles, when there are several debtors and creditors.

52. On the left hand page,	And on the right hand page the words,
The Leger title of the account being entered, the following circumstances are to be observed in making the entry:	*Contra*, *Cr.* Being entered,
1st, The date;	1st, The date;
2d, The Journal folio;	2d, The Journal folio;
3d, Each creditor title, which is the cause of this entry;*	3d, Each debtor title, which is the cause of this entry;
4th, The transaction belonging to the title;	4th, The transaction belonging to this Leger title;
5th, The mark, quality, &c,	5th, The mark, quality, &c.
6th, The quantity, or in some accounts inner columns for domestic or foreign money attended with loss or gain;	6th, The quantity, or in some accounts inner money columns for domestic or foreign money attended with loss or gain;
7th, The folio of the creditor.	7th, The folio of the debtor;
8th, The amount in the money columns.	8th, The amount in the money columns.

And therefore all the entries are formed in a different manner.

1810.	J. F.	*Cash*, *Dr.*		L. F.	£	s.	d.
Aug. 25.	5	To sundries, received from Bryan Connor		6	96	0	0
		But in this manner the full proof is in the Leger.					
July 25.	5	To Laurence Lawson, *H|A.* Wares . . .	Received from Bryan Connor	6	50	0	0
		To Paul Leech, Rouen, *H|A.* Burgundy Wine		6	46	0	0

CHAP. VI.

Auxiliary Books.

Auxil book.

53. Having shewn how the transactions are entered in the Leger, the forms of which are followed in the Cash-book, in the Book of Accounts Current, and in the Book of Charges, some observations are to be made on them, as connected with the Leger.

Cash

54. In the Cash-book are entered on the left side the receipts, and on the right the disbursements,

The Date,
Consideration, *i. e.* debtor or creditor,
Person,
Specie,
Sum.

Once in a month the total is transferred to the Waste-book, and through the Journal to the Leger.

It is better to post it immediately in the Leger, and check it by the folio reference to and from the Leger.

Book Accou Curre

55. The Book of Accounts Current contains the copies of such accounts as are sent to employers: they are evidently in the Leger form, though more particular than the general entries of the Leger ad-

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* When several titles are united in one transaction, the word Sundries is used to include them. By this method it is impossible in the Leger to ascertain the correctness of the entry.

mit; for the charges, which are collected into one sum in the Leger, may in the Journal post have several lines; therefore an exact copy is necessary to prevent disputes. This book ought to have an alphabet as well as a Leger check. The Example, § 164, will shew how exactly these accounts should follow the accounts in the Leger.

56. The Book of Charges is useful to save the immense trouble of making three different entries for each trivial sum which must be expended in a large family connected with an extensive business. The use of the other auxiliary books is to be now explained.

57. The Bill-book. The immediate use of this book is to save the trouble of resorting to the Leger, to examine when the bills become due, and also when the merchant's notes become payable; that the former may be collected, and provision made for the payment of the latter.

58. It may be advisable to enter in this book any sums which are otherwise receivable or payable within the succeeding month; such as annuities, rent, &c. The entries in it are very particular, as will appear from this example:

1st, The number of the bill in the order of its entry;
2d, The Drawer, Accepter, Promiser;
3d, Promissee;
4th, Every Indorser;
5th, Date;
6th, Day payable;
7th, Amount of;
8th, Cost of;
9th, How disposed of;
10th, The amount received.

The 8th and 10th columns are the exact drafts of the outer columns of the Leger entries.

59. The Invoice-book contains every particular relating to the goods shipped in the most obvious language; as, goods shipped in such a ship, A. B. master, consigned to A. C. of such a place, to be sold for account,
or by order of;
or for the account of E. F. and me;
or for the account of A. G. and E. F. and me, each ⅓d.

60. Then mention the
Quantity,
Quality,
Mark,
Number,
Cost,
Charges,
and if the transaction be for another, the Commission.

After every particular is mentioned, the total is carried to the waste entries, in which there ought to be a reference to the folio page of this book.

61. The Book of Sales is written in the form of the Leger, like the Invoice-book.

It contains on the left hand page the particulars of the wares to be sold, and on the right hand page the different sales made. Though in the form of the Leger, it is one of the Day-books, and may have all the advantage of the Leger reference; thus, it may be a sure draft for the book-keeper. It was introduced into the office to shew immediately the quantity of wares for sale; afterwards its great utility appeared by the opportunity it afforded to make up the factorage and company accounts, when it was not possible to do so on account of the great arrear in the posting of the Leger. The final entries of each account of this book are carried to the Journal, and then to the Leger; in both they are posted by the title Sundries; about which title, see note on § 52.

This book will be mentioned § 182.; it is of principal use in forming the balance sheet, and, by the brief manner in which it is formed, will give no additional trouble in the office. See the Numero-book of each of these sets, immediately after the Journal, from which it is posted by the denominator of the fractional expression annexed to those accounts that are to be brought to it.

Book of Commissions.

62. The Book of Commissions contain a fair copy of all the orders received from employers, by which the merchant must exactly regulate his conduct to avoid all loss through mistake on this part.

Book of Letters.

63. The Copy-book of Letters is also necessary for the same purpose.

Book of Ships Accounts.

64. The Book of Ship Accounts, like the Invoice-book, contains too many particulars to be left to the entry in the Waste-book.

The expenses from the arrival to the sailing should make but one Leger entry, which will shew the great importance of this book. It ought to have a Leger check.

CHAP. VII.

The Methods hitherto used to prove the Leger to be a Transcript of the Day-book, and the Balance in the Leger.

Whether the Leger be a fair copy of the Day-book.

65. It is taken for granted, that every transaction of the merchant's business is truly entered in the Day and Auxiliary books. Any omission in these must be supplied by memory, and regularly posted.

66. A great difficulty arises to know, whether the Leger be a fair and true copy of the Day-books, and to prove this various expedients have been contrived;
1st, Such as the examination of the posting marks in the Journal.
2d, The particular, and
3d, The general trial balance.
4th, The separation of the money columns by months in the Leger.
The utility of each of which shall be now examined.

67. When any article is posted from the Journal to the Leger, there is a mark by a figure, referring to the page in the Leger in which the same entry is made; each figure, according to its place, (§ 48.) expressing a debtor or creditor entry. To examine these, by calling over the whole Journal, gives a proof, by inspection, that each article is entered both on a debtor and creditor side.

68. The next process is to add all the debtor columns of the Leger into one sum, and the creditor columns into another. If these two sums agree, there is nothing to hinder the merchant to proceed to a balance; if they do not agree, a trial balance is to be made of each month, that the particular month in error may be known.

69. For this purpose, it is better to have this done

at the close of every month; that a general balance in the Leger may not be a matter of uneasiness to the merchant.

70. It may happen, that the credit or debit may be really entered, but in an account to which it does not belong. This error cannot be removed but by inspection; at the same time it must be observed, that this error may extend only to two or three accounts, and seldom to more than five. In the plan now presented to the public, this inconvenience is removed.

71. A method has been lately recommended, to form four money columns to the left of the debtor side, each to contain three months, at which period the total was to be entered in one line in the narrative of the account; the same process was to be observed in the right of the creditor side, and carried into the narrative of the creditor side. This seems to abridge the labour of the merchant, but has this evil consequent to it, that his accounts furnished can never be the transcript of his Leger, for the important entries of it, (§ 55, 56, 61.) should the Day-book be lost or injured, the memorial of the whole transaction is utterly destroyed; while, by the common method, these two inconveniences are avoided.

72. From what has been said, the total sums of the debtor and creditor side must be found equal, before the merchant can proceed to the final business of closing the accounts.

Balance in the Leger.

73. The word Balance has, to this period of the Book-keeping, been used to express the equality of the whole of the opposite sides of the Leger entries; but now it is limited to point out the difference between the amount of the inner columns of all the real and personal accounts, and the difference of the outer columns of the cash account, and of such personal accounts as have no inner columns, (§ 38.) except the single case of insolvency.

74. Thus it is a title peculiar to the Leger, and is an account formed by

Debtor	*and Creditor.*
On the debtor side are the	*On the creditor side*
Cash,	The debts due by the merchant.
Wares not sold, Paper effects, } remaining. Single effects, }	The amount of sales of such goods as could not be specially valued.
Debts due to the merchant.	
The cost and charges of such goods as could not be balanced, as their special value was not known.	

This leads to the solution of the problem of Book-keeping, *What is the merchant worth?* The difference between these two sides is evidently the answer; and the proof is given by the succeeding operation.

The difference between the columns of the cash account being found, it is brought to the balance sheet. The inner columns of the wares are compared, to shew what quantity remains; this is found and valued at the first cost, and the amount carried to the outer column, and from it to the balance title: next, the amount of the inner columns of the personal accounts is valued according to the rate of exchange, and carried to the outer column, and from it to the balance sheet; and, finally, the difference of each other personal account is carried to the balance sheet. What had been done on the opposite sides of the whole Leger, is now to be done on each particular account; and the difference between the two sides being added to the less, the equality of the two sides appears instantly to the eye. In pursuance of this plan, the outer columns of all those accounts that have inner columns, and the inequality of the sides of the summary titles of

Charges, }
Commission, and } are to be made equal, and the title chosen for this is, Profit and Loss.
Interest, }

Profit, means excess; loss, separation; so in those accounts which have inner columns, if the debtor side exceeds the creditor, there is a loss; because the produce of the sale was less than the price of the purchase: on the contrary, if the creditor side exceeds the debtor side, there is a gain, which remains unnoticed in some real or personal account. From this it must appear, that this summary account, profit and loss, is appropriated to the Leger, and can never appear in the Journal, unless some entire account be at that time closed in the Leger, as will be proved in the process of the second and third sets; it must also appear, that this title profit and loss is unnecessary in forming the balance sheet, when that account is not connected with the Leger. The particular sums connected in the several accounts, with the title profit and loss, are transferred to one general account, and the difference of the two sides of it made equal by the title stock. If the difference is to be brought to the creditor side of the stock account, it shews, by addition, what is the property of the merchant; and if the difference is to be brought to the debtor side of the stock account, it shews, by subtraction, what is the property of the merchant; and, therefore, these two accounts are necessary to shew, that the balance in the Leger is correctly taken; and is the only proof that can be given, that errors have not been committed in the posting of the Leger.

75. Now, in the balance sheet, the difference between

Dr.	*Cr.*
And what the merchant has, and What is due to him.	What the merchant owes

Is really what he is worth.

And in the stock account, the difference between

Dr.	*Cr.*
Or lost since.	What the merchant had when he began. What he gained since.

Is really what he is worth.

Therefore these two accounts, apparently different from each other, leave a proof, that the accounts are fairly stated, so far as they relate to the Leger.

The entire value of the property at the commencement was represented by the stock account; the increase or decrease of it was particularly marked by the closing of the real accounts, of the personal accounts with inner columns, and of the three summary accounts, and brought to the stock account.

The property in the actual possession of the merchant, or under his claim, can be nothing more or less than the substitute of stock, increased or decreased by the profit and loss account.

CHAP. VIII.

The Method of Closing the Accounts.

80. Some accounts are closed without any additional entry, when the inner and outer columns are respectively equal.

81. Some are closed by balance, when the inner columns are not equal.

82. Some are closed by balance and profit and loss.

83. Some real accounts are closed by personal, either totally as factorage real, by employer his account; or partially, as company accounts, by the partner's account, and profit and loss.

84. Profit and loss, and balance by stock.

85. And stock by balance.

86. Therefore, all the other accounts are closed in the order of the pages of the Leger.

87. Then the balances are collected, and all the accounts, which of their own nature produce a gain or loss, are closed by profit and loss. It is closed by stock; and stock and balance close each other.

CHAP. IX.

The Titles closed by Balance.

88. The following titles are closed by balance:

Cash remaining.
Wares not sold.
Voyages, the account of sales not received.
Stock in a company not sold.
Bottomry, no account of the safe arrival received.
Bills, } not received.
Bonds, }
Ships, or shares, } remaining.
Houses, lands, moveables, }
Personal accounts, when the total or part only is due.

CHAP. X.

Particular Methods for each Title.

89. Some are closed by balance and profit and loss, which shall be now shewn under each title.

Cash.

90. The debit shews the sums received, and the credit shews the sums paid; credit the account *by* balance for the excess of the debit above the credit, which is the sum remaining in the chest; if it should happen that the ready money in the chest does not agree with the sum mentioned, there is an error, which must be sought after, if considerable, and if it cannot be discovered,

91. And the cash be more than the balance account states, debit the account to profit and loss for the difference.

92. If the money be less, credit the account by profit and loss for the difference,

93. And then credit the account by balance for the exact sum in the chest.

Wares.

94. The debit shews the cost and charges and compensation for defects, and the credit the produce by sale.

95. There are four cases.

96. If none be sold, credit the account by balance for the amount of the debtor side.

97. If all be sold, debit the account to profit and loss for the gain.

98. Or credit the account by profit and loss for the loss.

99. If part be sold and part be unsold, credit the account by balance, for what remains unsold at its value, including prime cost and all charges, and then debit the account to profit and loss for the gain, or credit the account by profit and loss for the loss.

100. If it be difficult to ascertain the value of what remains unsold, the account may be closed by entering on the creditor side, thus, by balance for the total of the debtor side, and debiting the account to balance for the total of the credit side, by which the account will appear in the next Leger in the very state in which it was in the present Leger.

101. Leakage may happen in casks of liquor.

102. And a lackage in the weights or measure, (see also § 142. A. B. my account), which, when observed, ought to be entered and carried to the credit side of the respective account in the Leger, observing to begin the entry with a black line, and only to enter the quantity missing in the inner columns.

Goods bought for Exportation.

103. The debit shews the cost, and the credit shews when and to whom consigned; if all remain, close the account by balance.

104. And if but part remain, it is better to close the account with a double balance.

Voyage.

105. The debit shews the cost and charges of the cargo; the credit shews the neat proceeds as they appear by the amount of the bill of sales received from the factor.

106. If the account of sales be not received, credit the account by balance for the total of the debtor side.

107. If the account of sales be received, credit the account by the factor, my account; and for the difference remaining between the two sides, close the account by profit and loss.

108. If any return in wares or bills for the neat proceeds be received, credit the account by that particular title, and close the account by profit and loss.

109. If it be a general account of voyages, credit the account by balance for such as remain uncertain, and close the account by profit and loss for the remaining difference.

Bills.

110. The debit shews the cost of such as are received by the merchant, the credit shews what they produce.

111. Credit the account by balance for so many as remain, allowing a separate line for each bill, in the manner each is expressed on the debtor side.

112. For the remaining difference, close the account by profit and loss.

Acceptances and Notes Payable.

113. The debit shews the cost of those you have paid.

114. And the credit shews the consideration for which they were accepted or passed.

115. For the notes not yet paid, debit the account to balance in as many lines as there are acceptances or notes remaining unpaid, in the manner each is expressed on the creditor side, and for the remaining difference close the account by profit and loss.

Bottomry.

116. The debit shews what consideration was given for such contracts, the credit shews what they have produced.

117. Credit the account in so many lines as there are contracts remaining in the terms in which they are expressed on the debtor side.

118. Close the account for the remaining difference by profit and loss.

Bonds.

119. This is of the same nature as the last, and closed in the same manner.

Bonds Payable.

120. This is of the same nature as acceptances and notes payable, and closed in the same manner.

121. Houses,
Lands,
Moveables, } are of the same nature, and closed in the same manner.

A Personal Account.

122. The debit shews the merchant's charge against that person, the credit shews his charge against the merchant.

123. Debit the account to balance, if the creditor side be greater.

124. Credit the account by balance, if the debtor side be greater.

An Account Current of

125. The merchant's business done by a factor, and titled A. B. my account.

126. The debit shews the employer's charge on the factor.

127. The credit shews the factor's charge against the employer, so when the account is sent to the employer,

128. The particulars of the debit of the one must be compared with the credit of the other.

There are three Cases,

129. When the factor's money is of the same value and denomination, and drafts on them, or remittances to them are made at par.

130. When the money is not foreign, and drafts and remittances are not made at par.

131. When the money is foreign, and drafts and remittances are not made at par.

132. In the first case the account is closed like a personal account.

133. In the second case the account requires inner columns, for the particulars of which the factor and the employer account with each other; the outer columns shew, what the several particulars of the inner columns respectively produce.

134. The inner columns are closed by balance; which balance is valued at the current rate of exchange, and carried to the outer columns.

135. The outer columns are closed by profit and loss.

136. The third case requires inner columns for the factor's money; close the inner columns with balance for what remains due either to him or by him.

137. Enter the value in the outer columns at the current rate of exchange.

138. Close the account with profit and loss.

139. Note.—When a factor furnishes an account, it is to be compared with the employer's Leger account; the debtor of each, with the creditor side of the other, and the factor's columns with the employer's inner columns.

140. The additional charges are to be examined, that if there be any mistake, the factor may be advised of it without delay.

141. When every charge is found to be exact, enter in one line on the credit side of your Leger account, and in the inner columns the total; and unless it so happen that the account have no inner columns,

142. Make no entry for any charges of interest, brokerage, or commission in the outer columns, as was observed of leakage and lackage, § 101, 102; the only exception to this is, when the gain or loss may arise from different causes, as 1st set, Leger, folio 4, by interest, and by the exchange.

143. Close the account with profit and loss.

144. Note also, that it may frequently happen that the merchant may desire to examine his books without settling with his factor, in which case the true method is to close with a double balance as mentioned. To understand the examples given in the different sets, it will be useful to refer to the following Tables of the par of exchange, which were then published, and this comparison will shew the course of the exchange.

145. A certain space of time allowed to the drawer of a bill, to give notice of the transaction to the acceptor, is expressed in the bill by the word *usance* (custom); it is a space of one or more calendar months, or months of 30 days; the first day of which, in some places, is reckoned as one.

Let the Learner consider the following Example of an Employer's Account Current, in the form in which it i be sent to him, without the corresponding Drs. and Crs. of the Leger Account, with which it is connected.

Mr Pierre Laroche, of Bourdeaux, in Account with A. B.

1810.		Dr. £.	s.	d.
Jan. 2.	To his draft of the 4th December to Mr Thos. Dillon and Co.	100	0	0
15.	To my remittance of 2400 livres, at 11d. per, on Brison	100	0	0
Feb. 3.	To his draft of the 20th of December, N. S. at usance, to Corn. Connor	95	0	0
16.	To my remittance of 1395, W. at 32d. per, on La Haye	186	0	0
Mar. 11.	To amount of butter and beef, sent him by his orders	260	0	0
20.	To agio of my advance on his affairs, at 6 per cent. per ann.	1	11	7
	To commission on £491, at ½ per cent. on the first 4 articles of the debit	2	9	1
	To brokerage on £961, at ⅛th per cent. on the 2d and 4th of the debit, and 1st, 2d, 4th, and 5th of the credit	1	4	0
	To postage of letters	0	12	8
		£746	17	4

Contra, 1810.		Cr. £.	s.
Jan. 20.	By my draft of £150 at 8 per cent. Eng. on Lawson, of London, for his account	162	0
Feb. 10.	By my draft on himself of 1990 livres Tournois, at 11¼d. per livre at us. to La Borde	90	0
28.	By his remittance on Thomas Hall	70	0
Mar. 9.	By his remittance of £250 Eng. on Dillon and Co. of London, negociated at 8 per cent.	270	0
13.	By my draft on himself of 3120 livres Tournois, at 11d. per to Tiabets	143	0
		£735	0
	By balance due to me, for which I debit his new account	11	17
		£746	17

Dublin, March the 20th, 1808.
Errors and omissions excepted.

The Method of Finding the Agio.

To find the Agio.

				Days.	Prod.
Jan. 2.	Paid . .	£100	for	13	1300
15.	Paid . .	110			
		210		5	1050
20.	Received	162			
		48		14	672
Feb. 3.	Paid . .	95			
		143		7	1001
10.	Received	90			
		53		6	318
16.	Paid . .	186			
		239		10	2390
26.	Received	70			
		169		3	507
Mar. 1.	Paid . .	250			
		419		2	838
3.	Received	270			
		149		10	1490
13.	Received	143			
To the 20.		6		7	42
				Total of the Product . .	9608

2

Divided by 100)9608			
then by 3)32	0	26	
	£1	12	0¼
Deduct $\frac{1}{73}$ . .	0	0	5¼
Agio at 6 per cent. . . .	£1	11	7

9608 divided by 100, are groats and decimals of a groat; this quotient divided by 3 are shillings; and 1 or 2 remaining are groats.

Subtract then
- 1s. 0d. for 73s, or £3 13 0
- 1d. for 73d. or 0 6 1
- ¼ for 73f. or 0 1 6¼

The operation is thus:

```
                          £6
                          20
                          ---
                          120
                            3 groats
         £160             ---
  5 |    365 ------------ 360 | 5
    |                    9608 |
    |    73                72 |
    |                    ---- |
    |    —1/73      100)9608  |
    |                    ---- |
    |                3)32026  |
  d.|  s. d.     20      ---- |
  1 for 6 1       £1  12  0¼
  0¼    1 6¼       0   0  5¼
                  ----------
                  £1  11  7
```

which the merchant may with ease at any time resort to ascertain what remain.

This short account is in

183. The Sales-book, or Numero or Warehouse-book. It is formed by debtor and creditor, and ruled in the manner of the Leger, with a column of reference to the Journal page of the entry.

184. It is uniformly posted by single entry, (because the counterpart is in the Journal,) except in the cases of

1st, Barter,

2d, Partial returns for consignments,

3d, And counterbalancing accounts between foreign factors. In these the two entries are in the Numero-book, 1st set, January 15th.

185. Wares received by gift are entered in the Numero-book; and if disposed of in the same manner, the quantity is separated by the creditor entry.

186. If the wares be bartered, the quantity given away is entered on the creditor side of its title, and the wares received are entered on the debtor side of its proper title.

187. The accounts with foreign or other factors, whose remittances are attended with loss or gain by exchange, have inner columns, which form these particular accounts in the same manner as the accounts of goods and wares; and, therefore, these balances, (§ 73.) are ascertained and collected in the same manner like the other balances, and respectively brought to the debtor or creditor column of the balances of the Day-book, according to the rate of exchange of the day, § 136.

188. All the accounts of wares, and with foreign and other factors, bills, and voyages, are entered in a very short though satisfactory manner, to enable the book-keeper to collect the balances, § 61.

189. The accounts of goods admit but of one exception, that is, when the precise value of any specific quantity cannot be made out, (§ 100.) in which case they are to be closed with a double balance, and the amount of the money, value of each sale, is to be entered in the Numero-book.

CHAP. XII.

Articles which have Entries in the Money Columns of the Journal.

Articles which have entries in the money columns of the Journal.

190. The rule of posting the Journal is, the title being entered in the language of the Journal, enter the amount of each debtor and creditor entry in the money column.

1st, Of cash.

2d, Acceptances and notes payable.

3d, Bonds payable.

4th, Contracts for money borrowed on bottomry payable.

5th, The discount of the 2d, 3d, and 4th articles, in the event of payment before they become due.

6th, The accounts title, A. B. his account, A. B. C. their account.

7th, All common personal accounts; the debtor and creditor sides of all these accounts exactly agree with the debtor and creditor side of the cash and personal accounts in the balance-sheet.

191. The creditor side of cash can never be greater than the debtor side, but by an error, § 89; if the creditor side of A. B. his account, and of A. B. C. their account, be greater, the merchant owes so much; and his property on the debtor side is lessened by so much.

192. But, Notes payable,
Acceptances,
Bonds payable,
Contracts for bottomry payable,

are real debts in their first entry, and being payable at a future day, may be lessened by discount; for this reason this title is to have a special entry in the money column of the debtor side, precisely to take off an error which would really be on the creditor side of the account; for example, if the note passed for £50 be paid by £49; the article for which it was passed really cost but £49. (See 1st set, March 19.) This item of discount will appear in the closing of these accounts in the Leger, by the title of profit and loss. All anticipated payments are within this rule.

193. Then let each page of the Journal be added, and the total of it carried to the balance-sheet, and collected into one sum in the balance-sheet.

194. The merchant then proceeds to examine by his Numero-book what

Wares,
Bills,
Bonds,
Bottomry contracts receiveable,
Ships,
Houses,
Lands,
Furniture,
} Remain.

What is the original value of the goods closed by a double balance; the total charges of wares on commission not closed; his share of wares in company; charges on do.; adventures in Co.; the balances due by foreign or other factors, whose accounts have inner columns; this total, with the total of the debtor side of the Journal, is the same that should appear on the debtor side of the balance sheet in the Leger.

195. And the total of the creditor side of the Journal, with the balances due by the merchant to foreign or other factors, whose accounts have inner columns, and the total cash amount of the sales of such wares as are closed by a double balance, and sales on commission not closed, form the same amount that should appear on the creditor side of the balance sheet in the Leger.

196. The difference between these two sides is the real property of the merchant, and solves the question, *What is the merchant worth?*

197. If the merchant desire to ascertain precisely his gain or loss for any particular period, he is then to debit and credit the stock title in the money columns in the Journal, whenever that title occurs; Leger, page 6.

198. And the difference of the two sides of the Journal, together with the balances of the Numero-book, will shew the gain or loss (balance-sheet, Leger); for the credit side of stock countervails all the effects the merchant has, and the debts due to him; as the debtor side countervails all the debts he owes; and therefore, if the debtor side of the Journal, with the balances of the Numero-book, be greater, there must be a gain: if it be less, there must be a loss. In the same manner, if the amount of the debtor and creditor sides of the stock account be added to the balance-sheet, (as it is, 2d account, Leger, page 6.) the gain or loss will appear in the same manner. The stock account also may be formed from the balance-sheet, as it is in the 3d account, Leger Balance.

199. Finally, to prove the correctness of the balance-sheet formed in the Day-books, there is nothing necessary, but to shew that the difference of the tots of the two sides of the Journal account is, and ought to be the same, as the sum or the balance of the cash and personal accounts in the balance-sheet of the Leger. In the Leger, 2d account, the sum is the same; and all the other items are proved by inspection to be the same.

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Book-Keeping.

DAY-BOOK.

				£	s.	d.
An Inventory of my Effects and Debts active, taken this Date by me A. B.						
EDINBURGH, *Jan.* 1. 1810.						
I have in ready money	£2000	0	0			
in the Royal Bank	4000	0	0			
my house and furniture, worth	1800	0	0			
7 pipes of port wine, A.	560	0	0			
Delivered 4 do. into Co. 1, under the direction of James Higgins	320	0	0			
Taken 5 tons of madder into Co. 2, with John Scott, (mark) A.	300	0	0			
Due to me						
By Robert Runner	100	0	0			
By John King, our account of exchange in Co. 3,	500	0	0			
	£9580	0	0	9580	0	0
2.						
Bought of Thomas Willan, for ready money, 3 Tons of madder, at £ $2\frac{2}{3}$ ℘ cwt. mark B.				160	0	0
2.						
Sold for ready money, 1 Pipe of port wine				94	0	0
2.						
Bartered with James Reeves, 1 pipe of port wine for $1\frac{1}{2}$ ton of madder, at £3 ℘ cwt. M. C.				90	0	0
2.						
Lent James Walsh, to be be repaid in 1 month, with interest, at 5 ℘ cent.				100	0	0
4.						
Drawn on John King of London, O. A. of Exchange, a bill of £50. at usance, favour of James Quin, or order; value received of do. at £ $1\frac{1}{4}$ ℘ cent. advance				50	12	6
4.						
Drawn on John King of London, O. A. of Exchange, a bill of £450, at usance, favour of James Williams, or order; value received of do. at £1 ℘ cent. advance				454	10	0
5.						
Received from James Higgins, the account of the sales of our red wine,						
The total sales of 8 pipes	£720	0	0			
His commission at $2\frac{1}{2}$ ℘ cent.	18	0	0			
The neat proceeds	£702	0	0			
My half is	351	0	0	351	0	0
which he paid me by a draft on the Royal Bank for that sum.						

Boo
Keep

(1)

DAY-BOOK.

	Drs.	£	s.	d.		Crs.	£	s.	d.
	Jan. 1. 1810.								
	Cash	2000	0	0					
	Royal Bank	4000	0	0					
	House, &c.								
	Port wine.								
	Adventure in Co. 1, with James Higgins.								
2/1	Madder in Co. 2. with John Scott, A.								
2	Robert Runner	100	0	0					
1	John King, O. A. Ex. Co. 3.					Stock.			
	2.								
3/1	Madder, B.				1	Cash	160	0	0
	2.								
1	Cash	94	0	0	2/1	Port wine.			
	2.								
3/1	Madder, C.				2	Port wine.			
	2.								
3	James Walsh	100	0	0	1	Cash	100	0	0
	4.								
1	Cash	50	12	6	4/1	John King, O. A. Ex. Co. 3.			
	4.								
1	Cash	454	10	0	4/1	John King, O. A. Ex. Co. 3.			
	5.								
1	Royal Bank	351	0	0	2/1	Adventure in Co. 1.			
		7150	2	6			260	0	0

Book-Keeping.

(2)

Jan. 6. 1810.	£	s.	d.
Received from the Royal Bank the balance of the interest account ending the 24th of December	40	0	0
6.			
Sold for the account of Co. 2, to James Taylor, for an accepted draft on the Royal Bank, the 10 tons of madder, marked A. 1 Ton at £4 0 0 } ℘ cwt. { £80 0 0 9 Ton at 3 10 0 } ℘ cwt. { 630 0 0 710 0 0	710	0	0
My commission on the sale, at £2½ ℘ cent. 17 15 0 692 5 0 My half is 346 2 6 John Scott's half is 346 2 6 Which I have paid by my draft on the Royal Bank	346	2	6
11.			
Remitted to John King of London for our account of exchange, John Ker's draft of £300 at usance, on Coutts and Co. of Do. to the order of John King, by my draft on the Royal Bank in favour of John Ker	297	0	0
12.			
Shipped in the Lark of Leith, Paul Henry master, and consigned to William Kane of Hull to sell for my account, 4½ tons of madder, at first cost. 3 Tons, B. £160 0 0 1½ Do. C. 90 0 0 Paid Freight, &c. 13 10 0	263	10	0
13.			
Sold William Kerr at 2 months, 1 Pipe of port wine	96	0	0
13.			
Bottled for the use of the house, ½ Pipe of the port wine	40	0	0
and used the remaining half to fill those that leaked.			
24.			
Counterbalanced by the desire of John King of London, what I owe him by the invoice of madder received this date, against what he owes me by our account of exchange. The balance to be brought to his account. The balance to be divided (see the Numero-book) is	8	2	6
He shipped in the Fame, James Lawson master, 5 tons of madder at £3 ℘ cwt.	300	0	0
25.			
Robert Runner is dead and insolvent. What he owed me is lost	100	0	0

(2)

	Drs.	£	s.	d.		Crs.	£	s.	d.
	Jan. 6. 1810.								
	Cash	40	0	0	1	Royal Bank	40	0	0
	6.								
1	Royal Bank	710	0	0	2	Madder in Co. 2.			
					5	Commission.			
					3	John Scott, H. A.	346	2	6
3	John Scott, H. A.	346	2	6	1	Royal Bank	346	2	6
	11.								
4/1	John King, O. A. Ex. Co. 3.				1	Royal Bank	297	0	0
	12.								
4/1	Voyage to Hull.				3	Madder, B. C.			
					1	Cash	13	10	0
	13.								
4	William Kerr	96	0	0	2	Port wine.			
	13.								
5	Charges.				2 2	Port wine. Leakage.			
	24.								
3/1	Madder, D.				3	John King, O. A. Ex. Co. 3.			
4/1	John King, O. A. Ex. in Co. 3.				4	John King, His account	4	1	3
						Profit.			
	25.								
5	Profit and loss.				2	Robert Runner	100	0	0
		1192	2	6			1146	16	3

(3)

	£	s.	d.
Jan. 26, 1810.			
Bought at the auction sales at six months, with the condition of the abatement of £1 ⅌ cent. ⅌ month for ready money,			
5 pipes of port wine at £75 ⅌ pipe	375	0	0
26.			
Bought of James Ker, on my note payable in two months,			
4 ton madder, at £2, 15s. ⅌ cwt.	220	0	0
27.			
Discounted to James Henry, the agent of the sales, my debt for the 5 pipes of port wine,			
The discount is £22 10 0			
And the sum due 352 10 0			
Paid by my draft on the Royal Bank	352	10	0
27.			
Discounted to James Ker, my note payable in two months, at 6 ⅌ cent. ⅌ annum,			
The discount is 2 3 7			
And the sum due 217 16 5			
Paid in ready money	217	16	5
28.			
Paid James Taylor the award of the examiners, who viewed the hogshead of madder M. A. by draft on the Royal Bank,			
My half is £5 5 0 John Scott's is 5 5 0	10	10	0
28.			
Paid for the honour of William Kane of Hull, his draft of £50, on James Henry, protested yesterday for nonpayment.			
Charges of protest £0 10 0			
Commission ½ ⅌ cent. 0 5 0			
	50	15	0
Feb. 2.			
Received from William Kane of Hull, an account of the sales of the 4½ tons of madder consigned to him the 12th current,			
The total sales £382 5 0			
His charges £0 11 6			
Commission and insurance of credit 4 ⅌ cent. 15 6 0			
15 17 6			
366 7 6	366	7	6
For which he has remitted me a draft of Laine and Co. on King and Co. at 7 days sight, for £417 . 2 : 6, which includes my former demand of £50, 15s.	417	2	6
2.			
Received from James Walsh, £100 lent to him	100	8	4
2.			
Paid the expenses of the house for the last month	50	0	0
Salaries £20 0 0 Petty charges 3 10 0	23	10	0

	Drs.	£	s.	d.		Crs.	£	s.	d.
	Jan. 26. 1810.								
2/1	Port wine				4	James Henry	375	0	0
	26.								
3/1	Madder, D. E.				4	Notes payable	220	0	0
	27.								
4	James Henry	352	10	0	1	Royal Bank	352	10	0
	Discount	22	10	0					
	27.								
4	Notes payable	217	16	5	1	Cash	217	16	5
	Discount	2	3	7					
	28.								
5	Profit and loss.				1	Cash	10	10	0
3	John Scott, H. A.	5	5	0					
	28.								
4	William Kane of Hull	50	15	0	1	Cash	50	10	0
					5	Commission.			
	Feb. 2.								
5/1	Bills.				4/1	Voyage to Hull by the Lark.			
					4	William Kane of Hull	50	15	0
	2.								
1	Cash	100	8	4	3	James Walsh Profit and loss.	100	0	0
	2.								
5	Charges.				1	Cash	73	10	0
		751	8	4			1450	11	5

Total Sums of the Day-Books collected together to form the Balance-Sheet.

Drs.	£	s.	d.	*Crs.* £	s.	d.
First page	£7150	2	6	£260	0	0
Second page	1192	2	6	1146	16	3
Third page	751	8	4	1450	11	5
	£9093	13	4	£2857	7	8
				6236	5	8
				£9093	13	4

The balance is the same as the Leger, fol. 6.

These total sums brought forward to form the entire account with the Numero balances:

Fol.		£	s.	d.		£	s.	d.
		£9093	13	4		£2857	7	8
	Numero Balances.							
1	Madder,							
	D. 5 tons	300	0	0				
	E. 4 do.	220	0	0				
1	Bills,							
	Laines and Co	417	2	6				
1	House	1800	0	0				
1	Port wine,							
	A. 3 pipes	240	0	0				
	B. 5 do.	375	0	0	Neat stock	9588	8	2
		£12,445	15	10		£12,445	15	10

And to find the neat gain, deduct the neat stock at the commencement of the business from the neat stock at the close of it, from the creditor side of the balance-sheet.

1810.		£	s.	d.	1810.		£	s.	d.
Feb. 4.	The neat stock at the close of,	£9588	8	2	Jan. 1.	Total effects	£9580	0	0
						Profit	8	8	2
							£9588	8	2

And to form the new account of stock.

Stock, 1810.		*Dr.* £	s.	d.	*Cash,*	*Cr.* £	s.	d.
Feb. 4.	To John King, H. A.	£4	1	3	By balance for the total effects and debts passive,	£9592	9	5
	To balance	9588	8	2				
		£9592	9	5				

NUMERO INDEX.

A	Fol.	B	Fol.	C	Fol.
Adventure in Co.	1	Bills	1		
D		**E**		**F**	
G		**H**		**J**	
		House	1		
K		**L**		**M**	
King, John, O. A. Ex.	1			Madder, in Co.	2
				Madder	3
N		**O**		**P**	
Q		**R**		**S**	
T		**V**		**W**	
				Port wine	1

(1)

NUMERO-BOOK.

		J. F.		L. F.	£	s.	d.
			Adventure in Co. 1.				
1810.			Mark. Pipes.		£	s.	d.
Jan.	1	1	Port wine, A. 4	2	320	0	0
			Madder in Co. 2.				
Jan.	1	1	½ tons 10	2	300	0	0
			John King, O. A. Ex. in Co. each one-half.				
Jan.	1	1	£500 Ex.	3	500	0	0
	11	2	300		297	0	0
			£800				
	24	2	Balance to be divided in the Journal, otherwise there can be no balance		8	2	6
			Madder.				
			Mark. Tons.				
Jan.	2	1	B. 3	1	160	0	0
			C. 1½	2	90	0	0
	24	2	D. 5		300	0	0
	26	3	E. 4		220	0	0
			13½				
			Voyage to Hull per the Lrk.				
			Mark. Tons.				
Jan.	12	2	Madder B. 3	4	250	0	0
			C. ½		13	10	0
			Bills.				
			Payable. Sum.				
Feb.	2	3	Laines, 7 days, £417 : 2 : 6	5			
Jan.	1	1	*House,*	1	1800	0	0
			Port Wine.				
			Mark. Tons.				
Jan.	1	1	A. 7	2	560	0	0
			B. 5	4	375	0	0
			12				

(1)

NUMERO-BOOK.

		J. F.		Mark.	Tons.	Ex.	I. F.	£	s.	d.
1810.			*Ca.*			*Cr.*				
Jan.	5	1	Closed.							
			Ca.			*Cr.*				
Jan.	6	2	Closed.							
			Ca.			*Cr.*				
Jan.	4	1	£50 0 0			1¼		50	12	6
			450 0 0			1		454	10	0
	24	2	300 0 0					300	0	0
			£800 0 0							
			Ca.			*Cr.*				
Jan.	12	2	Voyage to Hull,	B.	3					
				C.	1½					
			Balance	D.	5		6	300	0	0
				E.	4			220	0	0
					13½					
			Ca.			*Cr.*				
Feb.	2	3	Closed.							
			Ca.			*Cr.*				
			Balance.							
			Ca.			*Cr.*				
			Balance.							
			Ca.			*Cr.*				
Jan.	2	1		A.	1					
					1					
	13	2			1					
					0½					
					0½					
Feb.	4		Balance, . .	A.	3		6	240	0	0
				B.	5			375	0	0
					12					

LEGER. (1)

		J. F.	*Stock,* Dr.	L. F.	£	s.	d.
1810. Feb.	4		To balance for my neat stock		9588	8	2

			Cash, Dr.				
Jan.	1	1	To stock in chest	1	2000	0	0
	2		To port wine received	2	94	0	0
			To John King of London, O. A. of Exchange in Co. 3.	3	50	18	6
	4		To John King of London, O. A. of Exchange in Co. 3.	8	404	10	0
	6	2	To Royal Bank received interest	1	10	0	0
Feb.	2	3	To James Walsh Profit and loss } received	3	100	8	4
					2759	16	10

			Royal Bank, Dr.				
Jan.	1	1	To Stock	1	4000	0	0
	5		To Adventure in Co. 1.	2	351	0	0
	6	2	To Madder in Co. 2.	2	710	0	0
					5061	0	0

			House, &c. Dr.				
Jan.	1	1	To stock for its value	1	1800	0	0

(1) LEGER.

		J. F.	*Ca.* *Cr.*	L. F.	£	s.	d.
1810.							
Jan.	1		By sundries for the total of my effects and debts active		9580	0	0
Feb.	4		By profit and loss for my neat gain	5	8	8	2
					9588	8	2
			Ca. *Cr.*				
Jan.	2	1	By madder, paid Thomas Willan	3	160	0	0
			By James Walsh, lent him	3	100	0	0
	12	2	By voyage to Hull, paid freight, &c.	4	13	10	0
	27	3	By notes payable, paid James Kerr	4	217	16	5
	28		By John Scott, his acceptance } Profit and loss } paid James Taylor	3 5	10	10	0
			By William Kane of Hull, paid bearer	4	50	10	0
Feb.	2		By charges, paid several	5	73	10	0
	4		By balance remaining	6	2113	14	5
					2739	10	10
			Ca. *Cr.*				
Jan.	6	2	By cash for interest	1	40	0	0
			By John Scott, H. Ac. for my draft	3	316	2	6
	11		By John King, O. A. Ex. in Co. 3.	3	297	0	0
	27	3	By James Henry for my draft	4	352	10	0
Feb.	4		By balance	6	4025	7	6
					5061	0	0
			Ca. *Cr.*				
Feb.	4		By balance	6	1800	0	0

LEGER.

(2)

Port Wine, *Dr.*

		J.F.		Mark.	Pipes.	L.F.	£	s.	d.
1810. Jan.	1	1	To stock, at £80, ⅌	A.	7	1	560		0
	26	3	To James Henry, at 75, ⅌	B.	5	4	375		0
					12				
							935	0	0

Adventure in Co. 1. with John Higgins, each one-half, *Dr.*

		J.F.		L.F.	£	s.	d.
Jan.	1	1	To stock for 4 pipes of port wine at £80 ⅌	1	320	0	0
			To profit and loss, gained	5	31	0	0
					351	0	0

Madder in Co. 2. with John Scott, each one-half, *Dr.*

		J.F.		Tons.	L.F.	£	s.	d.
Jan.	1	1	To stock, for my half of, at £3 ⅌ cwt.	10	1	300	0	0
	6	2	To commission		5	17	15	0
			To John Scott, H. A. for his ½ of the neat proceeds		3	346	2	6
Feb.	4		To profit and loss		5	46	2	6
						710	0	0

Robert Runner, *Dr.*

		J.F.		L.F.	£	s.	d.
Jan.	1	1	To Stock	1	100	0	0

		J.F.				L.F.			
			Ca.		*Cr.*				
1810.				Mark.	Pipes.		£	s.	d.
Jan.	2	1	By cash, sold	A.	1	1	94	0	0
			By madder, given in barter		1	3	90	0	0
	13	2	By William Ker, sold at 2 months		1	4	96	0	0
			By charges for the house		0½	5	40	0	0
			By leakage		0½				
Feb.	4		By balance }	A.	3	6	240	0	0
				B.	5		375	0	0
					12				
							935	0	0
			Ca.		*Cr.*				
Jan.	5	1	By Royal Bank, for the neat proceeds			1	351	0	0
			Ca.		*Cr.*				
Jan.	6	2	By Royal Bank, sold James Taylor		Tons.				
			at £4 0 0 ⅌ cwt.		1	1	80	0	0
			3 10 0 do.		9		630	0	0
							710	0	0
			Ca.		*Cr.*				
Jan.	25		By profit and loss, for his insolvency			5	100	0	0

LEGER. (3)

John King of London, O. A. of Exch. in Co. 3. each one half, *Dr.*

1810.		J.F.		Ex. per cent.	L.F.	£	s.	d.
Jan.	1	1	To stock, for remittances. £500		1	500	0	0
	11	2	To Royal Bank, for John Ker's draft on Coutts and Co. London, for 300	1	1	297	0	0
			To John King, H. A. gained by exchange		4	4	1	3
			To profit and loss, do.		5	4	1	3
						805	2	6

Madder, *Dr.*

		J.F.		Mark.	Tons.	L.F.	£	s.	d.
Jan.	2	1	To cash, bought of Thos. Willan, at £2 13 4 ⅌ cwt.	B.	3	1	160	0	0
			To port wine, received in barter 3 0 0	C.	1½	2	90	0	0
	24	2	To John King, O. A. exch. for the balance 3 0 0	D.	5	3	300	0	0
	26	3	To notes payable, bought of James Ker 2 15 0	E.	4	4	220	0	0
							770	0	0

James Walsh, *Dr.*

		J.F.		L.F.	£	s.	d.
Jan.	2	1	To cash lent, to be repaid in one month, with interest at 5 ⅌ cent.	1	100	0	0
			To profit and loss, gained	5		8	4
					100	8	4

John Scott, his account, *Dr.*

		J.F.		L.F.	£	s.	d.
Jan.	6	2	To Royal Bank, for the neat proceeds of madder in Co.	1	346	12	6
	28	3	To cash, for the award against the madder spoiled	1	5	5	0
					351	17	6

(3)

LEGER.

		J. F.	Ca. Cr.			L. F.			
				Ex.			£	s.	d.
1810. Jan.	4	1	By cash, for my draft, favour of James Quinn 50	1¼		1	50	12	6
			By cash, for my draft, favour of James Williams 450	1		1	454	10	0
	24	2	By madder for the balance of this 300	0		3	300	0	0
							805	2	6
			Ca. Cr.						
				Mark.	Tons.				
Feb.	12	2	By a voyage to Hull	B. C.	3 1½	4	250	0	0
Feb.	4		By balance do.	D. E.	5 4	6 6	300 220	0 0	0 0
							770	0	0
			Ca. Cr.						
Feb.	2	3	By cash, for principal and interest, ...			1	100	8	4
			Ca. Cr.						
Jan.	6	2	By madder in Co. 2. for the neat proceeds, ...			2	346	12	6
			By balance due to me, ...			6	5	5	0
							351	17	6

LEGER. (4)

		J. F.		L. F.	£	s.	d.
			Voyage to Hull per the Lark, Paul Henry, Master, *Dr.*				
1810. Jan.	12	2	To madder, consigned to William Kane for my acceptance	3	250	0	0
			cash, paid freight for tons 4½	1	13	10	0
			To profit and loss	5	102	17	6
					366	7	6
			William Kerr, *Dr.*				
Jan.	13	2	To port wine, for 1 pipe	2	96	0	0
			James Henry, *Dr.*				
Jan.	27	3	To Royal Bank, for my draft	1	352	10	0
			To profit and loss for the discount	5	22	10	0
					375	0	0
			Notes Payable, *Dr.*				
Jan.	27	3	To Royal Bank paid to James Ker £220	1	217	16	5
			To profit and loss for the discount	5	2	3	7
					220	0	0
			William Kane of Hull, *Dr.*				
Jan.	28	3	To cash for his draft protested	4	50	10	0
			To commission at ½ per cent.	5	0	5	0
					50	15	0
			John King of London, H. A. *Dr.*				
			To balance due to him	6	4	1	3

(4) LEGER.

		J.F.		L.F.	£	s.	d.
			Ca. *Cr.*				
1810. Feb.	2	3	By bills for the neat proceeds	5	366	7	6
			Ca. *Cr.*				
Feb.	4		By balance due	6	96	0	0
			Ca. *Cr.*				
Jan.	26	3	By port wine bought from him	2	375	0	0
			Ca. *Cr.*				
Jan.	26		By madder, passed to James Ker | Payable. March 26. |	3	220	0	0
			Ca. *Cr.*				
Feb.	2	3	By bills for the amount	5	50	15	0
			Ca. *Cr.*				
Jan.	24	2	By John King, O. A. Ex. gained by exchange	3	4	1	3

Book-Keeping.

LEGER.

(5)

		J. F.		L. F.	£	s.	d.
			Bills, Dr.				
1810. Feb.	2	3	To voyage to Hull, William Kane, } for Laine and Co. on King and Co. Payable. 7 days . . . . . . £417, 16s.	4	417	2	6
			Commission, Dr.				
Feb.	4	4	To profit and loss, gained	5	18	0	0
			Charges, Dr.				
Jan.	13	2	To port wine for the house	2	40	0	0
Feb.	13	3	To cash, for salaries and petty expences	1	73	10	0
					113	10	0
			Profit and Loss, Dr.				
			To Robert Runner, lost	2	100	0	0
			To charges	5	113	10	0
			To cash paid for the defect of madder in Co.	1	5	5	0
			To stock for my neat gain	1	8	8	2
					227	3	2

		J. F.		L. F.	£	s.	d.
1810.			*Ca.* *Cr.*				
			By balance	6	417	2	6
			Ca. *Cr.*				
Jan.	6	2	By madder, on . . . . £710 . . . . at 2½ ℘ cent.	3	17	15	0
			By William Kane, on . . 50 . . . . at ½ ℘ cent.	4	0	5	0
					18	0	0
			Ca. *Cr.*				
Feb.	4		By profit and loss for the balance	5	113	10	0
			Ca. *Cr.*				
			By adventure in Co. . . . . gained	2	31	0	0
			By madder in Co. . . . . do.	2	46	2	6
			By James Walsh . . . . do.	3	0	8	4
			By John King of London, O. A. Ex. . . do.	3	4	1	3
			By voyage to Hull . . . . do.	4	102	17	6
			By James Henry for discount . . . . do.	4	22	10	0
			By notes payable for do. . . . . do.	4	2	3	7
			By commission . . . . do.	5	18	0	0
					227	3	2

		J. F.	*Balance,* *Dr.*	L. F.	£	s.	d.
1810. Feb.	4		To cash,	1	2113	14	5
			To Royal Bank,	1	4025	7	6
			To John Scott, his account,	3	5	5	0
			To William Kerr,	4	96	0	0
			£6240 6 11				
			The following are the same as the balances collected from the Numero-book:				
			To house and moveables,	1	1800	0	0
			To port wine, A. 3 pipes.	2	240	0	0
			To ditto, B. 5 ditto.		375	0	0
			To madder, D. 5 tons.	3	300	0	0
			To ditto, E. 4 ditto.		220	0	0
			To bills, for Laine and Co.	5	417	2	6
					9592	9	5

1st Account.

The total of the columns of the Day-books,

	Drs. £	s.	d.	and *Crs.* £	s.	d.
1st page,	£7150	2	6	£ 260	0	0
2d page,	1192	2	6	1146	16	3
3d page,	751	8	4	1450	11	5
	£9093	13	4	2857	7	8
Balance, as it appears on the credit side of this sheet.				6236	5	8
				£9093	13	4

Therefore this part is truly done, about which alone a doubt might be entertained.

3d Account.

To form the Stock Account of the next Leger.

Stock.	*Dr.* £	s.	d.	*Ca.*	*Cr.* £	s.	d.
To balance, debt passive, for John King, H. A.	£ 4	1	3				
For neat stock,	9588	8	2	By balance for the total of my effects and debts active,	9592	9	5
	£9592	9	5				

LEGER.

(6)

		J. F.	*Ca.* *Cr.*	L. F.	£	s.	d.
1810.							
			By John King of London his account, ...	4	4	1	3
			This balance of the cash and personal accounts is the same as that in the Day-book, page 4. £ 4 1 3 6236 5 8 £6240 6 11				
			By stock, for my neat stock, ...	1	9588	8	2
					9592	9	5
			2d Account.				
			To find the profit and loss on the entire account, enter in the money columns of the Day-book the respective sums belonging to that title whenever it occurs, and the difference between the two columns will answer the question; as,				
			Dr. *Cr.*				
Feb.	4		Balance, . . . £9592 9 5 £ 4 1 3				
Jan.	1		Stock, ... 9580 0 0				
			9584 1 3				
			Profit and loss, 8 8 2	5			
			£9592 9 5				

*** For the preceding excellent article, the Editor is indebted to the Rev. Denis Ferrall of Dublin, to whom the mercantile world are under great obligations for the valuable invention which it contains.

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BOOM. See NAVAL TACTICS, and SHIPBUILDING.

BOORS, a general appellation for the Russian peasantry, who are divided into two great classes, distinguished by the names of vassal boors and free boors. It is necessary to observe, however, that the free peasants, though generally comprehended among the boors, both in state papers, and in the enumeration of the people, are, in reality, a distinct class, forming a middle link between the burghers and the vassal-peasantry, to whom the name of boors properly belongs. These free peasants cannot be alienated or sold; most of them possess immoveable property, and are left in the undisturbed possession of what they earn, provided they duly pay their taxes, or perform their stated tasks of labour; they have the privilege of educating their children as they please; and, in short, are as completely exempted as their superiors from all authority, except that of the sovereign and the laws of the state. Under this class are included the foreign colonists who have settled in Russia as husbandmen; and the odnodvortzi, or one-house owners, who possess their houses and the lands belonging to them as free property, for which they neither perform feudal services, nor give any portion of their produce; but are compelled to furnish recruits, to pay the poll tax, and abrock, and are expressly prohibited from purchasing in villages, or possessing vassals as property. The Kozacks, or Cossacks, in all their branches, Tartars, Bashkirs, Vogulls, Kalmucks, most of the Monadic tribes, and the inhabitants of the steppes, as they have a real and heritable property in their lands, belong properly to the class of free peasants. Disbanded soldiers, who go to reside in the country, and vassals who have purchased their freedom from their superiors, or obtained it as a reward for their faithful services, are likewise to be numbered in the same class. The male Russian peasantry, or those of Little Russia, hold a kind of intermediate rank between the vassal boors and those we have described, being neither so dependent as the former, nor so free as the latter: they are attached as fixed property to the land, separately from which they can neither be alienated nor sold.

The vassal boors are sunk in the most abject slavery. Disqualified from holding any possessions of their own, they and their families are at the absolute disposal of their lords, by whom they may be alienated, sold, or exchanged, like any other part of their property. These degraded people may be distributed into three classes,—crown boors, boors of the mines, and private boors.

In the condition of the first class, who are the vassals of the crown, there are various gradations of servitude and misery. Some of them are absolute and disposable property; others are attached to the mines, and can neither be sold, nor have it in their power to remove; while others are merely tasked with a certain portion of work, or obliged to pay a stated quantity of the produce of their labours. A striking difference may be observed between the condition of the peasants of the crown, and that of the boors who belong to individuals. In general the former merely pay to government an abrock or rent of about five rubles at an average; and as they are certain that it will never be raised, they have every encouragement to exert themselves for the improvement of their fields, or the amelioration of their condition. Many of these are in such comfortable circumstances, that they might almost forget their state of vassalage, did not the crown possess, and sometimes exert, the power of granting them away.

Boors.

The crown boors are distinguished by various denominations, according to their respective employments, or to particular circumstances in their condition. Eight distinct kinds of crown boors are mentioned in the laws and ukases of Russia: empire boors, who belong neither to the court, nor the nobility, nor to the monasteries, but are members or burghers of the empire; imperial boors, who belong to the monarch personally, or rather to the court; boors of the black plough, who inhabit great part of northern Russia, as far as Archangel; post boors, who, in lieu of the abrock and other taxes, are bound to keep post horses; court boors, whose service and tribute go to the support of the imperial court; monastery boors, formerly attached to the monasteries, but now throughout Great, Little, and White Russia, uniformly found under the Kameral-hofs; economy boors, who, in Great Russia, were taken from the monasteries and churches, and made subordinate to a particular college of economy, established for that purpose, but since abolished, so that the boors are under the Kameral-hofs, retaining however their former name; and peltry tribute paying boors, who deliver their tribute in peltry or furs. The crown boors possess one important advantage over boors of every other description, being permitted to purchase from noblemen, villages and lands, with the vassals belonging to them.

Mine boors.

The next general class of boors are those called mine boors, who are attached to particular mines, apart from which they cannot be sold or exchanged, though they may be transferred along with the works to different masters.

Private boors.

The third class comprehends those boors who belong to individual noblemen, and whose condition, of course, depends entirely on the temper or the caprice of their lords. The condition of many of these boors indeed is far from being unhappy; for when their lords are wealthy and good natured, requiring only a moderate abrock, they are enabled to grow rich, and to enjoy many of the comforts of life. In general, however, the abrock demanded by their proprietors is regulated by their means of getting money, and becomes thus a direct tax upon the industry of the peasant. The abrock exacted by individual proprietors from their peasantry, amounts, at an average, to about eight or ten rubles annually for every male. Besides this abrock, the lord may demand from his slave the labour of three days during each week; or may even employ him every day, provided he furnish him with food and clothing. Nor is this task service imposed on male slaves alone. Women, and children above the age of ten, are likewise compelled to perform their share. When the peasant is thus obliged to give his labour for three days in the week, the abrock is in general diminished. But still both the quantity of labour which he has to perform, and the amount of the tax which he must pay, depends entirely on the will of his tyrant. To render his servitude still more oppressive, he must resign to his lord a tythe of all the property which he may earn by the culture of his little spot of land, or by any manual employment; and if by any accident he should be deprived of the tribute which he is expected to pay, he must beg, borrow, or steal, to make up the deficiency. The master is obliged to furnish his vassal with a house, and a small portion of land, the allotment of which is settled by the storasta, (elder of the village,) and a meeting of the peasants themselves. If they happen to exercise any trade more profitable than agricultural employments, the abrock imposed upon them is proportionally higher. Peasants employed as drivers, pay a certain portion even of their drink money, for being permitted to drive. The aged and infirm are allowed a certain portion of food and raiment; but if any of them chuse rather to depend on public charity, than to subsist on the wretched pittance which they receive from their lords, they must pay a certain abrock out of what they earn by begging. A master is allowed to correct his slave by blows and confinement; but for any wanton cruelty, is amenable to the laws, which are said to be executed in such cases with the strictest impartiality. A certain countess was lately confined in one of the prisons near Moscow with an unrelenting severity, which she had justly merited by her barbarity towards her slaves. Instances of the most dreadful cruelty, however, frequently occur. M. Heber, as quoted by Dr Clarke, mentions one instance of a nobleman having caused his slave to be nailed to a cross. The master was sent to a monastery, and the business was hushed over. The slaves, in their turn, are extremely vindictive. Some years ago, the master of a distillery suddenly disappeared, and it was universally understood that his boors had thrown him into a boiling vat. No slave can quit his village, or his master's family, without a passport, which he must produce to the storasta of every town or village through which he happens to pass. The punishment of a runaway is imprisonment and hard labour in the government workhouse; and if a person be found dead without a passport, his body is given for dissection. The boors on the coasts or frontier provinces often find means to effect their escape. In the interior it is extremely difficult, yet desertion is very frequent, particularly in summer, or when there is to be a new levy of soldiers. A slave can, on no pretence, be sold out of Russia, and in Russia to none but a person of noble birth, and, if not noble, having at least the rank of lieutenant-colonel. This law, however, is sometimes evaded: Many of the boors are sold to plebeians; and all nobles have the privilege of letting out their slaves for hire. In short, the condition of the boors is, in general, deplorably wretched. The only property which their lords allow them to possess, is the food which they themselves cannot, or will not eat, the bark of trees, chaff, and other refuse; grass, water, and fish oil. If by any means they acquire any portion of wealth, it becomes a very dangerous possession, and when discovered, is invariably seized by their tyrannical lords. A peasant in the village of Celo-Molody, near Moscow, who had accumulated considerable wealth, wishing to marry his daughter to a tradesman of the city, offered his lord fifteen thousand rubles for her liberty. The tyrant took the ransom, and then told the father, that both the girl and the money were his property, and that she must still continue among the number of his slaves. "It is thus," says Dr Clarke, "we behold the subjects of a vast empire stripped of all they possess, and existing in the most abject servitude; victims of tyranny and torture, of sorrow and poverty, of sickness and famine." "Traversing the provinces south of Muscovy," he continues, "the land appears as the garden of Eden, a fine soil, covered with corn, and apparently smiling in plenty. Enter the cottage of the poor labourer, surrounded by all these riches, and you find him dying of hunger, or pining from bad food, and in want of the common necessaries of life. Extensive pastures, covered with cattle, afford no milk to him. In autumn, the harvest-field yields no bread for his children. The lord claims all the produce. Can there be a more affecting sight than a Russian family having got in an abundant harvest, in want of the common stores to supply and support them, through the rigours of their long and inclement winter!"

The empress Catharine often expressed her anxiety to abolish the system of vassalage throughout the empire, or at least to ameliorate the condition of the boors, and to restrain the abuses to which they were exposed. To accomplish this benevolent purpose, she instituted a regular tribunal for the boors, entirely chosen out of their own body; delivered the boors at the mines from the oppressive servitude in which they had formerly been held; appointed overseers and guardians to prevent every species of violence; and on all occasions recommended gentleness and humanity, of which she herself exhibited a most laudable example.

By far the greater number of vassals in Russia are those who have been born of bondmen. By the common law of Livonia, every child, born of an unmarried vassal, belongs to the estate on which it is born, whether the father has been bondman or free. Peter I., however, ordained, that a child born in such circumstances should be free, if a freeman own himself its father, and cause it to be baptised in his name. Notwithstanding the degraded state in which the boors are generally held, some of them rise to considerable respectability. Several have been known to obtain commissions in the army for their good behaviour; and others live comfortably at home, having abundance of wholesome food, and neat and becoming apparel. In some villages they display a degree of comfort, and even of wealth, which the peasantry of very few countries can rival.

A Russian nobleman estimates the value of his estate by the number of his vassals, as a West Indian estimates his by the number of hogsheads. Some of them possess seventy, or even an hundred thousand. In all mortgages, the national lombard takes the vassal at forty rubles; but in the sale of an estate, they are seldom or never estimated at so low a price. In the government of St Petersburgh, every slave is valued at 200 or 300 rubles, according to the quality of the estate; in other parts of the empire their price is commonly much lower, though there is scarcely any part of the empire where it is under 100 rubles.

According to an enumeration of male inhabitants made from 1781 to 1783, in the forty-one viceroyalties of the empire, the number of crown boors was 4,674,603, and of private boors 6,678,239. See Tooke's *View of the Russian Empire*; and Clarke's *Travels*, chap. 9. (*k*)

BOOSHOOANAS, or Booshuanas, a tribe of Caffres who inhabit a fertile country in the south of Africa. Their manners are remarkably simple, and their principal occupation is in attending their cows, and hunting the antelope. The relative duties of the men and women are, in a singular manner, interchanged. The women break up the ground with an iron hoe, sow the seed, reap the grain, and deposit it in their granaries in a state fit for use; while the men attend the cattle, milk the cows, and prepare the different articles of dress for their wives and children.

The capital of the Booshooanas is Leetakoo, a large and populous town, which is divided into two parts by a river of considerable size. Leetakoo was estimated by the commissioners who visited it in 1801, to be as large in circumference as Cape Town, including all the gardens of Table Valley. The streets are regular, and the buildings very low. The ground plan of every house is exactly circular, and is from 12 to 15 feet in diameter. The floor consists of hard beaten clay, elevated about four inches above the surface of the ground. The lower part of the house, to the height of four feet from the floor, is formed of stone laid on clay, having wooden spars erected at certain distances. About one-fourth part of the circle is entirely open, and this open part was the part which seemed always to face the east. By means of an inner circular wall passing through the centre of the house, and of the same radius as the outer wall, so as to cut off one-third of the circumference, an apartment is formed, in which they deposit their clothing, their ivory ornaments, their hassagais, (the weapon which they use in hunting and fighting,) their knives, and other articles of value. In this apartment the heads of the family sleep, while the children sleep in the half closed viranda, which comprehends two-thirds of the circumference of the circle. The roofs of the houses are round, and pointed in the form of a tent, thatched with reeds, or the straws of the holcus. Every house is surrounded with a pallisade, the open space between which and the house is reserved for the granary. The grain is lodged in jars of baked clay, each of which holds about 100 gallons. Each jar stands upon a tripod of baked clay, which raises it about nine inches from the ground. A round straw roof, erected on poles, forms a covering for the jars in such a manner, as to allow an opening into each of them. Leetakoo contains about two or three thousand houses, and ten or fifteen thousand inhabitants. East Long. 27°, and South Lat. 26° 30′. See Barrow's *Voyage to Cochin-China*, p. 390. (H)

BOOTAN, or Butaan, a province dependant on Thibet, and situated between that country and Bengal. The limits of this province are not accurately ascertained. Paridrong, and the chain of mountains near it, were supposed to have been the boundary between Bengal and Thibet; but it appears from later authorities, that they form the boundary between Thibet and Bootan. This country abounds with lofty mountains, covered with eternal verdure. Rich orchards, fertile fields, and thriving villages, crown their summits, while forests of lofty trees rise at their base. Bootan is bounded on the south, by a ridge of mountains, which, in the space of fifteen miles, rise to the perpendicular height of one mile and a half from the plains of Bengal. The few passes that are to be found in this chain are strongly fortified, and the road to Tassasudon, the capital of Bootan, is over the rugged summits of high mountains and dangerous precipices. In advancing still farther into the interior, we meet with another lofty chain of mountains covered with snow, called *Rimola*, or *Himmaleh*, which is seen at the distance of 150 miles. This chain runs between Tassasudon and Paridrong, and the mountains are supposed to exceed in height even the highest of the Andes. Mr Turner is of opinion, that iron, and a small portion of copper, are the only metals in this province. The inhabitants of Bootan are supposed to have a nearer affinity to the Chinese than to the Hindoos. They carry on a considerable commerce with the people of Sirinagur. They bring to that country rock salt and borax, and carry back in exchange the salt which is brought from Lahore, and is called *Nemuk Lahooree*. For a more complete account of this province, see Turner's *Account of an Embassy to the Court of the Teshoo Lama in Thibet*. See also Captain Thomas Hardwicke's *Narrative of a Journey to Sirinagur* in the *Asiatic Researches*, vol. vi. p. 369. and Thibet. (H)

BOOTES, the name of a constellation in the northern hemisphere, containing 23 stars in Ptolemy's catalogue, 28 in Tycho's, 34 in Bayer's, 52 in Hevelius's, 54 in Flamstead's, and 64 in the catalogue published in the *Tables de Berlin*. See Astronomy, p. 751. (*w*)

BOPAL, or Bopaltal, a town of Hindostan, and capital of a territory of the same name in the country of Malwa. As the only correct account of this town is that which is given by Mr Hunter, in his *Narrative of a Journey from Agra to Oujein*, performed in the year 1792, we shall make no apology for presenting it in his own words.

"The town of Bopal is extensive, and surrounded with a stone wall. On the outside is a large gunge, with streets wide and straight. On a rising ground, to the south-west of the town, is a fort called Futteh-gurh, newly erected, and not yet quite finished. It has a stone wall with square towers, but no ditch. The spot on which it is built is one solid rock. To the south-west, under the walls of this fort, is a very extensive tank, or pond, formed by an embankment, at the confluence of five streams issuing from the neighbouring hills, which form a kind of amphitheatre round the lake. Its length is about six miles, and from it the town has the addition of *tal* to its name. These hills, and others in the neighbourhood, contain a soft free stone, and a reddish granite, the latter of which seems well calculated for buildings that will resist water and the injuries of the weather. It is accordingly used in the new embankment, which is now building at the east end of the lake. From this part issues the small river Patara, and it is said that the Betwah takes its rise from another part of the same.

The town and territory of Bopal are occupied by a colony of Patans, to whom they were assigned by Aureng-Zebe. The present Nawab, Mohammed Hyat, a man about sixty years of age, had, from indolence, love of pleasure, want of capacity, or devotion, resigned the whole administration into the hands of his dewan, who was born a Bramin, but purchased, when a child, by the Nawab, and educated in the Mussulman faith.

The revenue of Bopal is estimated at ten or twelve lacks of rupees. It does not pay any regular tribute to the Mahrattas; but, from time to time, a handsome present is given to conciliate their friendship. The people seem to be happy under the present government; and the dewan, by his hospitality, and the protection afforded to strangers, had induced the caravans, and travellers in general, to take this road between the Deccan and Hindostan." East Long. 77° 28′, North Lat. 25° 14′. See *Asiatic Researches*, vol. i. p. 31, 32. (*j*)

BORACIC Acid. See Chemistry.

BORACITE. See Oryctognosy.

BORAGO, a genus of plants of the class Pentandria, and order Monogynia. See Botany. (*w*)

BORASSUS, a genus of plants of the class Diœcia, and order Hexandria. See Botany. (*w*)

BORAX. See Chemistry.

BORBONIA, a genus of plants of the class Diadelphia, and order Decandria. See Botany. (*w*)

BORDA, John Charles, a celebrated French mathematician and natural philosopher, was born at Dax, in the department of the Landes, on the 4th of May 1733. His mother was Maria Theresa de Lacroix, and his father was John Anthony Borda, whose ancestors had acquired considerable distinction in the French army.

The subject of the following article began his studies in the college of the Barnabites at Dax, where he gave early indications of his future genius. Having remained a considerable time at this seminary, he was put under the charge of the Jesuits of La Fleche; and such was his ardour for study, and his superiority of talents, that he very frequently carried off the prizes which were held out as the reward of youthful genius. The Jesuits were not blind to the greatness of his talents, and exerted their utmost endeavours to press him into their order; but his attachment to geometry was too powerful to be weakened by any allurements which the Jesuits could hold out.

The ardour for mathematical research which Borda so early displayed, received an unfortunate check from his father, who was hostile to the prosecution of such unprofitable studies. Borda saw the opposition with which he was to be assailed, and endeavoured to soften it by proposing to enter into the engineer service of the army, where the objects of his profession would necessarily require a knowledge of geometry and physics. His father, however, having eleven children, and being obliged to support two of his sons who were already in the army, was anxious that Charles should look forward to some situation in the magistracy, which might be obtained without much expense and trouble. To these views of his father Borda reluctantly submitted; but, after having thus lost some of the most precious years of his youth, a friar, who was a particular friend of his father, obtained, by earnest solicitation, the repeal of a sentence which had condemned to perpetual inactivity the genius and talents of his son.

When every restraint was removed, Borda devoted himself to his favourite science; and, in the year 1753, when he was only twenty years of age, he was thought worthy of being introduced to the celebrated D'Alembert. Borda was at this time about to enter into the engineer service, which would have carried him to a distance from Paris; but D'Alembert, who felt an interest in his future progress, wrote to his friends, dissuading them from such a step, and advising him to remain in the capital, and look forward to a situation in the academy. Influenced by this advice, Borda entered the light horse, and continuing his mathematical studies, he became professor to his comrades.

In 1756, he laid before the academy a memoir on the motion of projectiles, which was particularly mentioned in the history of its proceedings; and in the same year he was appointed an associate of the academy.

In the following year he was called into active service, and was present at the battle of Hastembeck, on the 26th July 1757, as aid-de-camp to M. de Maillebois. He willingly returned, however, from a species of duty which interrupted the progress of his studies; and upon his arrival at Paris, he became a candidate for a situation in the engineer service; and such was the estimation in which his talents were held, that he was received without examination, and immediately employed as an inspector of the dockyards.

This new appointment was particularly favourable for calling into action the peculiar talents of Borda. It inspired him with a fondness for every thing that related to the naval service; and, what seldom happens to the man of genius, he found himself in a situation in which he was led both by his profession and by his inclination to the same line of study.

The first subject of his research was an examination of the theories of the resistance of fluids, a subject intimately connected with the advancement and perfection of naval architecture. The experiments upon this subject made by the Academy of Sciences, were by no means fitted to determine the resistance of bodies that were wholly immersed in the fluid. Borda, however, employed a method which was susceptible of great accuracy, and had also the advantage of ascertaining accurately the velocity of the motion. The surfaces upon which his experiments were made were of various forms, and the experiments were made both in air and water. The results of these experiments are extremely interesting, and are given at great length in the Memoirs of the Academy for 1763 and 1767. We are compelled, however, to say, that the apparatus employed by Borda was not of his invention. A machine of the same kind had been used some time before by our ingenious countryman, Benjamin Robins, in his admirable experiments on the resistance of air.

We are indebted to Borda likewise for many ingenious experiments and observations on the motion of fluids through different orifices. He prepared a theory of the motion of fluids different from that which had been given by Bernoulli and D'Alembert, and he made new experiments on the *vena contracta*.

In the year 1767, he published an excellent dissertation in the Memoirs of the Academy, entitled, *Memoires sur les Roues Hydrauliques*. In that valuable paper he has shewn, that an undershot wheel produces a maximum effect when its velocity is *one-half* that of the current, though in practice the velocity is never more than three-eighths that of the current. He proved, after Deparcieux, from theory, before Smeaton had determined it by experiment, that the effect of overshot wheels increases with the slowness of their motion; that they are capable of raising, through the height of the fall, a quantity of water equal to that by which they are driven; that undershot vertical wheels produce only three-eighths of this effect; that horizontal wheels produce about one-half of this effect with plain floatboards, and a little more than one-half with curvilineal floatboards.

This memoir of Borda was followed by another, in 1768, on the construction of water-pumps. About this time his attention was directed to isoperimetrical problems, and he had the honour of obtaining the same results as Lagrange, though by a different method.

The last work of our author, which appeared in the Memoirs of the Academy, was a dissertation on the Theory of Projectiles. The immense differences between the theory and the experimental results which had been obtained on this subject, stimulated the ingenuity of Borda. He found, that the range of a twenty-four pounder was diminished nine-tenths by the resistance of the air; and that the diminution would be still greater when the flight of the ball was opposed by wind; and he has formed a table, shewing the results calculated for pieces of all calibres, for all angles of elevation, and for various ranges and degrees of velocity.

The success and utility of the labours of Borda brought him under the particular notice of M. Praslin, the minister of marine, who was anxious to have the benefit of his talents in the French navy. The practice of the service, however, opposed such a plan, and the officers of the navy naturally resisted a measure which might ultimately prove injurious to their own interests. But M. de Praslin had taken his resolution: He considered the brilliancy of Borda's talents as entitling him to an exception from general usage, and he therefore appointed him sub-lieutenant in the navy.

Borda made his first appearance in his new profession in the year 1768, but, till the year 1771, no events occurred which are deserving of notice. The prizes which were at this time offered, both in England and France, for the improvement of chronometers, to find the longitude at sea, naturally produced in both countries a great variety of inventions. The French government having determined to try the accuracy of some of these time pieces, and of other instruments which were subsidiary to the great object of finding the longitude, the Academy of Sciences appointed Borda and Pingre as commissioners for making these trials; and they were ordered to sail in the *Flora* frigate, under the command of Verdun de la Cranne. This voyage was performed in the years 1771 and 1772, during which they touched at various places in Europe, Africa, and America, and completely fulfilled the objects for which they were sent out. An account of this voyage was published at Paris in 1778, in 2 vols. 4to, entitled, *Voyage fait par ordre du Roy en* 1771 *et* 1772, &c. A shorter account of the results obtained during the expedition will be found in the Memoirs of the Academy for 1773.

The zeal and success with which Borda had performed his part in this expedition, pointed him out as the fittest person to be employed in determining the position of the Canary Isles. With this view he was promoted to the rank of lieutenant in 1775, and in the year following he set sail in the frigate *La Boussole*, having under his orders the *Espiegle*, commanded by M. de Puysegur. During this interesting voyage he determined the relative and absolute position of the Canary Isles, by means of several points taken on each, and on the coast of Africa. He verified the height of the Peak of Teneriffe, and calculated tables for finding the position of a ship at sea from the apparent height of this mountain. He examined the peak itself with great care, and brought home with him several mineralogical specimens.

M. Borda was appointed major-general to the naval armament which sailed from Toulon under the Count D'Estaing, and he was present with that distinguished commander at all the naval operations, by which he contributed to the final emancipation of America. In this high situation, the wisdom, prudence, and integrity of Borda excited the admiration of his fellow officers.

From the experience which he had now obtained of the naval service, Borda perceived many defects in the construction of vessels, which could easily be remedied. He considered the want of uniformity in the construction of ships which were to act together as a great defect, from which arose a great discordance in their movements, and in the execution of signals. Upon his return to France, he communicated this idea to the government, who immediately resolved to carry it into effect. The best form for a ship of 74 guns was selected by Borda from a variety of constructions, and was made the model for the formation of others; and the same plan was followed for vessels of different rates.

In the year 1781, Borda was appointed to the command of the vessel Le Guerrier; and in the year 1782, he obtained the command of the Solitaire, a ship of 64 guns, for the purpose of escorting a body of troops to the island of Martinique, at a time when the reduction of all our West India islands was the favourite object of the allies, and when they had actually succeeded in the capture of the islands of Nevis and St Christophers. Borda had the good fortune to convoy the troops under his orders to their final destination; and having joined the fleet under the Count De Grasse, he was ordered to a cruising station with the command of several frigates. After he had separated from the fleet, a thick fog came on, and Borda had the mortification to find his little squadron in the middle of eight English ships of war. He tried, in vain, to extricate himself from a force so superior to his own; and when he found that escape was impossible, he refused to surrender till his own ship became a complete wreck. Borda was treated with great kindness and distinction by the English, who sent him back to France upon his parole; but the chagrin which he felt for the loss of his squadron, and the fatigues of three naval campaigns, having begun to produce a serious effect on his health, he determined to spend the remainder of his days in the quiet prosecution of science and philosophy.

During his voyage along with Pingré in 1771, Borda found, from experience, that the valuable quadrant invented by our countryman Hadley, was susceptible of great improvement. The celebrated Tobias Mayer had already endeavoured to remove its imperfections. He made the instrument a complete circle, and repeated the measure of the angle on different parts of its graduated circumference. By taking a mean of these measures, he obtained a result independent of the various sources of error to which Hadley's quadrant was liable. M. Lefevre Gineau, the biographer of Borda, declares that the idea of Mayer was never carried into effect, and thus endeavours to ascribe the whole merit of the invention to his own countryman. This statement, however, is completely false; one of Mayer's circles was made for Admiral Campbell by Bird; and Mayer had himself used an instrument for measuring terrestrial angles upon the repeating principle, which is described in the *Commentaries of the Royal Society of Gottingen*, for 1752, tom. ii. p. 325.

Borda having examined, with the utmost attention, the construction proposed by Mayer, soon perceived its defects, which he has pointed out in his *Description et usage du Circle de Reflexion*, published in 1787. These defects he had, in a great measure, removed, in a new circle of his own invention, which was first made in 1777; and which has since been employed with great success, under the name of the *Circle of Borda*. This instrument, however, excellent as it was, had still numerous imperfections; and it was reserved to our ingenious countryman, Mr Troughton, to bring to perfection one of the happiest inventions that was ever made. See ASTRONOMY, p. 722. and CIRCLE.

When the French government had resolved to reform their weights and measures, Borda was appointed by the Academy one of the commissaries for fixing the basis of the new system. With this view he invented a most simple and ingenious method of measuring, with extreme accuracy, the length of the pendulum; he gave a new form to the rods which were employed for measuring a base in trigonometrical surveys; he employed a most ingenious method of measuring the changes which they suffered from a difference of temperature; and he ascertained the increments in length and bulk which platina, iron, and brass sustained when the temperature was raised from 1° to 180° of Fahrenheit. Borda was delighted with this national work, and exerted himself with the utmost zeal to bring it to a close. The parsimony of the French government, however, interrupted his progress, and he was often obliged to advance money to the different artists who were employed in this great undertaking, but who had sought in vain for payment from the public treasury. The experiments were at length completed. The conferences with the foreign commissaries were opened, and nothing remained but to enjoy the praise which had been so laboriously earned. Borda, however, was not destined to receive, during his life, that high reward at which genius aspires. The severity of the winter enfeebled his constitution, and brought on a dropsy in the breast, of which he expired on the 20th of February 1799, in the 64th year of his age.

Though Borda devoted his chief attention to the physical sciences and the useful arts, he had a great predilection for poetry and belles lettres; and the Odyssey of Homer was his favourite work. The respect which Borda's talents always inspired, was supported by the excellence of his private character. His conversation was agreeable and instructive, and was animated by a vivacity of temper which rendered him a pleasant member of society. Borda was, in 1797, one of the candidates for the office of a director of the French republic; but he did not possess those talents for intrigue, which would have ensured success in such a struggle.

Besides the works which we have already mentioned, Borda drew up, in conjunction with M. Delambre, the *Tables trigonometriques Decimales*, which was published at Paris in 1801.

The account of his voyage to the Canary Isles, drawn up by himself, and full of interesting information, has not yet been published; but we have reason to believe that this work, along with other manuscripts and fragments written by Borda, will soon be given to the world. (*o*)

BORDENAVE, TOUSSAINT, a celebrated French physician, was born at Paris on the 10th April 1728. The profession of a surgeon having been almost hereditary in his family, his father was anxious that it should be continued in the person of his son, and gave him a complete education in languages and philosophy, to qualify him for the situation which he might be called to fill. The progress which he made in the Latin language was so great, that he learned to speak it with unusual fluency; and this circumstance alone gave him great consideration in his own profession, and in the public schools, at a time of life when he could not otherwise have been entitled to receive it.

Bordenave was extremely desirous to have a seat in the Academy of Sciences; and, in the year 1774, he was appointed a veteran associate of that learned body. This appointment being in direct hostility to the rules of the academy, gave great dissatisfaction; and though Bordenave himself deprecated this mode of admission, the members of the academy were naturally irritated at such an intrusion. The mildness and modesty of Bordenave, however, gained him the friendship of his colleagues, and he enriched the memoirs of the academy with several valuable papers.

Bordenave was created *Echevin* of Paris, and he was the first person who had been elevated to this office. On the birth of an heir to the throne, he was rewarded with the ribbon of the order of St Michael; but he did not long enjoy this honour. He was struck with apoplexy; and, after eight days of suffering, he expired on the 12th of March, 1782.

Bordenave was professor royal and director of the Academy of Surgery, and member of the Imperial Academy at Florence. To the Memoirs of the first of these institutions he contributed many valuable papers on various subjects in surgery, medicine, and anatomy. In 1756, he published his *Essai sur la Physiologie*, in 12mo, which was reprinted in 1764. In 1757, he published his *Remarques sur l'insensibilité de quelques parties*, 12mo. In 1768, he published a translation of Haller's Elements of Physiology, for the benefit of his pupils. In 1769, appeared his *Dissertations sur les Antiseptiques*, 8vo; and in 1774, he published his *Memoires sur le danger des Caustiques pour la cure radicale des Hernies*. See Haller's *Bib. Chirurg.*; and the *Mem. Acad. Par.* 1782, *Hist.* p. 78. (π)

BORDER. See GARDENING.

BOREALIS, AURORA. See AURORA *Borealis*.

BORELLI, JOHN ALPHONSUS, a celebrated Italian physician and anatomist, was born at Castel Nuovo, in the kingdom of Naples, on the 28th of January 1608. Having been sent to finish his education at Rome, he made rapid progress under the care of Castelli, and acquired such a reputation for his abilities, that he was invited to teach mathematics at Messina in Sicily. In 1647 and 1648, a malignant fever having broken out in that island, and committed dreadful ravages, Borelli paid particular attention to the disease, and published a treatise upon it at Cosenza, entitled, *Delle ragioni delle febri maligni di Sicilia*, 12mo, 1649. From Messina he went to Pisa, where he was appointed professor of philosophy and mathematics, an office which he filled with great success. The fame of his talents had reached the ears of the Grand Duke Ferdinand, and of Prince Leopold, through whose influence he was honoured with a seat in the Academy del Cimento. About this time he began to employ his mathematical knowledge in explaining the functions of the animal œconomy; and we accordingly find, that between the years 1659 and 1664, he wrote numerous letters to Malpighi upon that subject, which were afterwards published in the posthumous works of that learned anatomist.

Having engaged in the revolt of Messina, he was obliged to quit Sicily and retire to Rome, where he lived under the patronage of Queen Christina, who was at that time resident in the capital of Italy. The liberality of the Swedish queen, however, does not seem to have been of great extent, as we find Borelli under the necessity of teaching mathematics in the pious schools in the convent of St Pantaleon, where he died of a pleurisy on the 31st December 1679, in the 72d year of his age.

Borelli carried on a correspondence with some of the leading philosophers of his age, particularly with Mr John Collins, Mr Oldenburgh, Dr Wallis, Mr Boyle, and Malpighi, and was held in high estimation among his contemporaries.

His principal writings are:

1. Delle ragioni delle febri maligni di Sicilia. Cosenza, 1649, 12mo.

2. Della cause delle febri maligni. Pisa, 1658, 4to.

3. Apollonii Pergæi Conicorum, lib. v. vi. et vii. Florent. 1661, fol.

4. De Renum usu judicium, accompanied by Bellini's treatise De structura Renum. Strasburg, 1664, 8vo.

5. Theoriæ Medicorum Planetarum ex causis Physicis deductæ. Florent. 1666, 4to.

6. De vi Percussionis. Bologna, 1667, 4to.

7. Euclides Restitutus. Pisa, 1668, 4to.

8. Osservatione intorno alla vista in eguali degli Occi, published in the Journal of Rome for 1669.

9. De motionibus naturalibus de Gravitate pendentibus. Regio Julio, 1670, 4to.

10. Meteorologia Ætnea. Regio Julio, 1670, 4to. Borelli having been present at the formidable and destructive eruption in 1669, drew up an account of it at the desire of the Royal Society of London, who printed it in their Transactions.

11. Osservatione dell' Ecclipi Lunari 11 Gennaro 1675, published in the Journal of Rome for 1675, p. 34.

12. Elementa Conica Apollonii Pergæi, et Archimedis Opera, nova et breviori Methodo demonstrata. This work was printed at Rome in 1679 in 12mo, at the end of the 3d edition of his Euclides Restitutus.

13. De motu Animalium. This work was published after Borelli's death. The first part appeared in 1680, and the second in 1681. A more correct edition was published at Leyden in 1685, along with John Bernoulli's Mathematical Meditations concerning the Motion of the Muscles. Another edition appeared at Leyden in 1686, under the care of Dr Broen, along with his two pieces, De vi Percussionis, and De Motionibus, &c.

The principal writings of Borelli are, his treatises on the Force of Percussion, and on the Motion of Animals. In the first of these works, he endeavours to demonstrate the proportion between the percussive force, the motion or the velocity of the percussion, and the resistance of the body struck; and he has not scrupled to say, that he has succeeded in demonstrating the nature, cause, properties, and effects of percussion. In this work he occasionally treats of gravity, magnetism, pendulums, and the tremor of bodies.

Borelli's treatise on the Motion of Animals, which was dedicated to Christina, Queen of Sweden, and printed at her expence, exhibits a fine application of the laws of statics to the motion of living beings. He supposes the muscular fibres to be vesicular, and their contraction to arise from the introduction of a portion of the nervous fluid, which mixes with the blood they contain, and by swelling them, shortens their length. He endeavours to measure the individual and the collective power of the fibres which compose a muscle; and he shews in what measure their power is varied, by the manner in which the fibres are united with the tendons. Varignon and Dr Keill have pointed out some errors in the calculations of Borelli; but these are quite trifling, when compared with the value and originality of this curious work. (π)

BORER. See AUGER.

BORGIA, CÆSAR, one of the most consummate villains mentioned in modern history, was the second son of Cardinal Roderigo, (afterwards Pope Alexander VI.) by his mistress Vanozza. The year of his birth is unknown; but he was pursuing his studies at Pisa when Alexander ascended the papal throne, in 1492. He immediately hastened to Rome to congratulate his father on his elevation, impatient to reap those honours which he had it now in his power to bestow. Alexander, instead of welcoming him with the warmth and exultation which his recent prosperity might naturally have inspired, received him with cold formality, admonishing him to repress his rising ambition, and to strive to reach preferment only by the path of virtue. A reception so ill suited to the aspiring temper of Cæsar, and so inconsistent with the known character of his father, at once mortified and surprised him. He retired in the utmost confusion from the presence of his Holiness, and went to seek consolation and advice from his mother. Vanozza exhorted him not to be discouraged, assuring him that she was well acquainted with his father's intentions, and that though he thought it necessary at present to assume an appearance of moderation and disinterestedness, he might confidently hope for every advantage from his indulgence, and his ambition for the aggrandisement of his family. These assurances were immediately confirmed by the promotion of Borgia, who was first made archbishop of Valenza, and, in the following year, appointed cardinal of St Maria Nuova.

Ecclesiastical preferments, however, could not satiate the turbulent and aspiring soul of Borgia, who seemed to feel the clerical habit an irksome, though a very feeble restraint, on the excesses to which his natural depravity prompted him, and longed for some temporal dominion, which might enable him to prosecute more successfully his schemes of ambition, and to yield with less disguise to the wildest impulses of his savage and impetuous temper.

When the army, which Charles the VIIIth of France led against Naples, had entered Rome, and compelled the Pope to a treaty, Borgia was forced to accompany the king as apostolical legate, or rather as hostage for the performance of the stipulated conditions. Finding an opportunity, however, to make his escape, the treaty was broken, and the king obliged to abandon Italy. Vanozza having been plundered by the French army while it lay at Rome, excited both Alexander and Borgia to take a severe revenge for her wrongs. They began by poisoning Geme, brother to Bajazet, who had fled from that sultan to Italy, as to a sanctuary, and had entered into a league with the French, who intended, after reducing Naples, to undertake an expedition against the Turks. They next proceeded, by means of assassins, to destroy the French who remained at Rome.

While Alexander thus employed Cæsar as the fittest instrument for the execution of his nefarious schemes, he, at the same time, shewed a marked predilection for his eldest son Francis, on whom he conferred all the secular dignities so much coveted by Cæsar, and who, through his influence, had been invested with the dukedom of Gandia, by Ferdinand king of Castile and Arragon. The hatred which Cæsar entertained against his brother, whom he regarded as the greatest obstacle in his career of ambition, was further inflamed by the suspicion, that he rivalled him in the affections of a particular lady. He resolved, therefore, at all hazards, to get rid of so troublesome a competitor; and accordingly hired four assassins, the chief of whom was Michelotto, a Spaniard, the most barbarous ruffian of the age, to assassinate his brother, and throw his body into the Tiber. The time which he fixed for the perpetration of this atrocious murder, was the eve of his departure for Naples, to assist at the coronation of King Frederic, in his capacity of apostolic legate. It is said, that when Alexander, overwhelmed with grief for the death of his favourite son, caused the most anxious inquiry to be made after his murderers, Vanozza went to him privately to induce him to give up the search, threatening that if he persisted, he himself should perish by the same hand which had destroyed his son.

About this time, Ferdinand and Isabella complained, by their ambassador, of a dispensation granted by the Pope, for the marriage of a nun, the only heiress to the crown of Portugal, to a natural son of the late king of that country,—a marriage extremely prejudicial to Ferdinand, who hoped to succeed to the Portuguese throne. Alexander, wishing to have Cæsar married to Charlotta, daughter to the king of Naples, who was the near relation and faithful ally of Ferdinand, saw how much his interest was concerned in freeing himself from the blame of that dispensation. Florida, archbishop of Cosenza, was therefore accused by Borgia of having forged it; and upon this charge he was immediately thrown into prison, where death, in a few days, released him from his unmerited sufferings.

Soon after this, Louis XII., monarch of France, solicited the Pope for a dispensation to divorce his wife Jane, and to marry Anne of Burgundy, widow of the late King Charles. Borgia eagerly seized this opportunity of promoting his ambitious designs; and having prevailed with his father to entrust him with the dispensation, he resigned his dignity as cardinal, and proceeded as ambassador to the French court. He was cordially received by Louis, who immediately created him Duke of Valentinois, granted him an ample pension, and appointed him to the command of a body of cavalry. With the view of extorting still more important favours, Borgia retained the dispensation for some time in his possession, pretending that he had not yet received it from Rome, but was in daily expectation of its arrival. Louis, becoming impatient, applied to the bishop of Setta, the Pope's nuncio at Paris, who assured him, that, notwithstanding the pretences of Borgia, he was certain that he had brought the dispensation along with him to France. Upon this, Louis convened a number of divines, who authorised him to divorce his wife, and to proceed, without further delay, to solemnize his marriage with Anne of Burgundy. Borgia, finding that his schemes were baffled, was obliged, with a very bad grace, to deliver the dispensation; but the discovery proved fatal to the nuncio, whom he carried off by a doze of that poison which he had always ready for administering to those who incurred his resentment, or stood in the way of his promotion.

As Charlotta, acquainted with his infamous character, shrunk with horror from his addresses, he sued for and obtained the hand of the daughter of the King of Navarre, and was honoured by Louis with the order of St Michael. Prosperity, like sunshine to a serpent, seemed only to rouse the inveterate malignity of his nature. Incredible numbers of victims were sacrificed to his revenge or his ambition; and not only in Rome, but in every part of the ecclesiastical dominions, he had assassins in his pay, ready, on the slightest hint, to execute his cruel designs. His father instigated or assisted him in his villanies; and having determined to reduce Romagna into subjection to the holy see, they dispatched a number of the richest cardinals, and seized their property, to enable them to carry on the iniquitous war which they had undertaken. As duke of Valentinois, Borgia was able to levy a considerable force in France, with which he proceeded to Romagna. He commenced his campaign with the siege of Imola and Forli, which soon surrendered. He next reduced Pesaro, Rimini, and Faenza; and, in the year 1501, was honoured, by his father, with the title of Duke of Romagna. Unheard of atrocities were committed by Borgia in the course of this war; which he pursued with such vigour and success, that the Italian powers, alarmed for their common safety, formed a combination to oppose him. He contrived, however, to defeat this confederacy by his usual arts of treachery and cruelty. He invited three of the leading men to Senigaglia, under a pretence of negociating peace, and caused them all to be strangled. Thus Borgia and his father proceeded in their usurpations, alternately courting the friendship of the monarchs of France and Spain, as the influence of either appeared to prevail or decline in Italy. Such was Borgia in his prosperity: a man whom Machiavel proposes as a model of imitation to all succeeding princes, who, like him, might acquire dominions by their valour or address; a man whose talents enabled him to form the most extensive schemes of aggrandizement, and whom no motives of justice, honour, or humanity, could ever move from his purpose.

Providence, as if to counteract the influence of such a pernicious example, condemned him to outlive the greatness which he had so foully acquired; to see his fortune dispersed, and his dominions wrested from him; to see his enemies prosperous and exalted, and himself sunk in the lowest poverty, and the most abject dependance. Poison, which Borgia and his father had prepared for nine wealthy prelates, on whose possessions they wished to seize, was drunk, through mistake, by themselves. The Pope died next day; but the youth and vigorous constitution of Borgia enabled him to recover, though he long experienced the pernicious effects of the poison. He escaped being massacred by the partizans of Pope Pius III., his father's successor, only through the protection of the king of France, whose party he afterwards ungratefully abandoned. Only four of the places which he had usurped now remained in his possession; and these, to secure his personal safety, he offered to resign to Pope Julius II., the successor of Pius III. Julius, though he at first refused them, afterwards ordered Borgia to be seized at Ostia, and confined in close custody till he had again agreed to resign them all. He now sought refuge in Naples; where he was treated at first with some respect by the Spanish general Gonsalvo de Cordova, but was afterwards sent to Spain, in consequence of an order from the king, and doomed to perpetual imprisonment in the castle of Medina del Campo. Here he was closely confined for two years, when, escaping out of a window by means of a rope, he fled to Navarre, where he was received in a very friendly manner by his brother-in-law King John. He intended to have gone from Navarre to France, with the view of engaging Louis to assist him in retrieving his fortune. Louis, however, instead of listening to his proposals, refused to receive him into his territories, confiscated his duchy of Valentinois, and withdrew his pension.

Thus degraded and destitute, he, whose ambition once knew no bounds, was forced to depend for subsistence upon his brother-in-law, who was then at war with his subjects. Cæsar engaged as a volunteer in his service, and was killed in a skirmish before the walls of Viana in the year 1507. His body was stripped by the victors, but was recognised by his servants, who carried it off the field on a horse, and interred it in the cathedral of Pamplona, of which he had formerly been bishop. "Hated in prosperity," says one of his biographers, "scorned in adversity, stripped of all his honours and possessions, even such as he might fairly have claimed, and leaving behind him a name consigned to universal detestation, it would seem that he gained little by being a villain."

He assumed as his motto, *Aut Cæsar, aut nihil*, which gave occasion to many epigrams; with two of which we shall conclude this sketch of his life. The first is written by Sannazarius:

Aut nihil, aut Cæsar vult dici Borgia; quidni?
Cum simul et Cæsar possit, et esse nihil.

The other is by an unknown author:

Borgia Cæsar erat factis, et nomine Cæsar.
Aut nihil, aut Cæsar, dixit; utrumque fuit.

See *General Biography*. *General Dictionary*. Gordon's *Lives of Pope Alexander VI. and his son Cæsar*. Machiavel's *Principe*, cap. 7.; and *Mod. Univ. Hist.* vols. xxiv. and xxvi. (*k*)

BORING MACHINE may be defined to be, any machine for working a borer, or tool, which, by a rotatory motion on an axis, cuts out a hollow cylinder in any substance subjected to its action.

The carpenter's whimble or crank, the drill, pulley, and bow, are, in this sense, boring machines; but custom has confined the term to signify, the apparatus which is used for boring out larger cylinders more quickly and accurately than can be performed by manual labour, but which requires the power of a water wheel, steam engine, or horse wheel, to give it motion. These machines are principally employed for two purposes; for boring wooden pipes for the conveyance of water, and for boring out the metalline cylinders used in hydraulics and in pneumatic engines. In the first case, the whole cavity is removed by the machine, which will be described under the article PIPE BORING; but in the latter, the machine is only used to smooth, and make true, the internal surface of the cylinder, which is cast hollow.

The accuracy of cylinders for pumps, steam engines, blowing engines, &c. is an object of so much importance in the construction of machinery, that many very expensive engines have been made for the purpose. The old and common method is to have an horizontal axis turned slowly round by the mill, at the end of which a borer is fixed, and the cylinder is fastened down upon a carriage, sliding in a direction parallel to its axis, and drawn forwards to the borer by the descent of a weight. The objection to this method is, that any deviation from a rectilineal motion in the carriage will be transferred to the cylinder, and cause it to be crooked; and that the weight of the borer and its axis acting on the lower side only of the cylinder, causes it to cut away more at that part, and render the metal of the cylinder of unequal thickness. This evil, however, was in some measure obviated by a contrivance of Mr John Smeaton, which was a steel-yard mounted upon a moveable wheel carriage, running within the cylinder. By suspending the weight of the cutter and boring bar from it, the machine was much improved, though still very imperfect.

Plate LXIV. Fig. 5.

A boring machine, for metal cylinders, which is not liable to any of these sources of error, is constructed in the manner shewn in Plate LXIV. Figure 5. is a perspective view of the machine in the action of boring out a cylinder for a steam engine; the other Figures explain the construction of its parts, and are drawn to a scale. In Fig. 5. AA denote two oak ground sills, which are firmly bolted down parallel to each other upon sleepers let into the ground. At each end of these a vertical iron frame, BB, is erected, to support the gudgeons at the end of a long cylindrical axis DD, which is turned round by the mill. The cylinder LL, which is to be bored, is fixed unmoveably over this bar, and exactly concentric with it. A piece of cast iron, KK, LL, (Figs. 2, 3, and 4.) called a cutter head, slides upon the axis, and has fixed into it the knives or steelings, *f*, *f*, *f*, which perform the boring. This cutter head is moved along the bar by machinery, to be hereafter described; by means of which it is drawn or forced through the cylinder, at the same time that it turns round with the axis D. The steel cutters will necessarily cut away and remove any protuberant metal which projects within the cylinder, or the circle which they describe by their motion, but cannot possibly take any more.

Figs. 2, 3, 4.

The cylinder is held down upon an adjustable framing, which is readily adapted to receive a cylinder of any size within certain limits. Pieces of iron EE are bolted down to the ground sills, having grooves through them to receive bolts, which fasten down two horizontal pieces of cast iron FF, at right angles to them. These horizontal pieces support four moveable upright standards GG, which include the diameter of the cylinder LL, which is supported upon blocks *bb* below, and held fast by iron bands *aa*, drawn down by screws in the top of the standards GG. The cylinder is adjusted to be concentric with the axis DD, and held firmly in its place by means of wedges driven under the blocks and the standards.

To explain the mechanism by which the cutters are advanced, we must refer to Figs. 2, 3, and 4, by the inspection of which, it will be seen that the axis DD is, in fact, a tube of cast iron hollow throughout. It is divided by a longitudinal aperture *cc*, Fig. 4, on each side. At the ends it is left a complete tube, to keep the two halves together. The cutter head KK, LL, consists of two parts,—of a tube KK fitted upon the axis D with the greatest accuracy, and of a cast iron ring LL fixed upon KK by four wedges. On its circumference are eight notches, to receive the cutters or steelings *f*, *f*, which are held in, and adjusted by, wedges. The slider K is kept from slipping round with the axis, by means of two short iron bars *ee*, which are put through the axis, and received into notches cut in the ends of the sliders KK. These bars have holes in the middle of them, to permit a bolt at the end of the toothed rack L to pass through. A key is put through the end of the bolt, which, at the same time, prevents the rack being drawn back, and holds the cross bars *ee* in their places. The rack is moved by the teeth of a pinion N, and is kept to its place by the roller O: the axis of the pinion and roller being supported in a framing attached to the standard BB, as shewn in the perspective view of the machine in Fig. 5. The pinion is turned round by a lever put upon the square end of the axis, and loaded with the weight P, that it may have a constant tendency to draw the cutter through the cylinder. This lever is capable of being put on the square end of the axis either way, so as to force the rack back into the cylinder if necessary.

In some boring machines, another contrivance, superior perhaps to what we have now described, is employed to draw the cutter through the cylinder. It consists of four small wheels, one of which is fixed at the right hand extremity D, of the bar DD, Fig. 4. Another pinion is fastened on the extremity of an axis, analagous to the rack M, having at its other extremity a small screw, which works in a female screw, fixed to the cutter KK at *e*, (Fig. 2.) Below the second pinion is another containing the same number of teeth, and fixed on a horizontal axis parallel to DD. At the other end of this axis is a fourth pinion, which is driven by the first pinion at the end of the hollow axis DD. The first pinion has 26 teeth, the fourth 30, and the second and third may have any number, provided they are equal. As the axis DD revolves, the first pinion fixed on its extremity drives the fourth, which, by means of the third fixed on the same axis with it, gives motion to the second. The second pinion being fixed to an axis within DD, unscrews the screw at its other extremity, and of course makes the cutter advance along the cylinder. This screw has eight threads in an inch, and sixty turns of the axis are required to cut one inch.

To introduce a cylinder into its place in the machine, it is necessary to remove the upper braces *ll* of the bearings, upon the standards BB; and by supporting the axis upon blocks placed under the middle of it, the standard, with the pinion N and roller frame, is removed, by taking up the nuts which fasten it down upon the ground sills AA, the rack M being supposed previously withdrawn. A cutter block L, of the proper size to bore out the intended cylinder, is now placed upon the slider K, (Fig. 4.), and wedged fast. The cutter head is then moved to the farther end of the axis, and the cylinder lifted into its place. The standard B is returned, and the whole machine brought to the state of Fig. 5, the cylinder being by estimation adjusted concentric with the axis D. Two bars of iron are now wedged into the apertures *c*, *c* in the axis, and applied to the ends of the cylinder; while the axis is turned round, they act as compasses to prove the concentricity of the cylinder. Small iron wedges are driven round the cylinder to adjust it with the utmost accuracy; and in this state the cylinder is ready for boring.

The next operation is fitting the cutters, which are fastened into the block L by wedges, and adjusted by turning the axis round, to ascertain that they all describe the same circle. The boring now commences by putting the mill and axis in motion, and the machine requires no attention, except that the weight P is lifted up as often as it descends by the motion of the cutters or steelings. When the cutters are drawn through the cylinder, they are set to a circle a small quantity larger, and returned through the cylinder a second time. For common work, these two operations are sufficient; but the best cylinders are bored many times, in order to bring them to a proper cylindrical surface. The last operation is turning the flaunch *n* of the cylinder perfectly flat, by wedging a proper cutter into the head. This is of great importance, to ensure that the lid will fit perpendicular to the axis of the cylinder. The cylinder is now finished and removed.

The accuracy of this machine depends on the boring bar DD being turned upon its own gudgeons; and if it is turned to the same diameter throughout, it will certainly be perfectly straight. While the axis is in the operation of turning, a piece of hard wood should be fitted into the grooves in the cylinder. The slider K is first bored out, and afterwards ground upon the axis with emery, to fit as true as possible.

The elevation of a mill proper for moving two of these machines, is represented in Fig. 1. The pinion 30 is supposed to be on the axis of a water wheel, and turns the two wheels 60, 60, which have projecting axes, with a cross cut similar to the head of a screw, as is shewn in the Figure.

The ends of the boring axes have similar notches, and by putting keys in between them, the motion may be communicated or discontinued at pleasure, by the removal of the key. (J. F.) (*o*)

BORMIO, a county in Switzerland, lying at the foot, and in the midst of the Rhetian Alps, upon the confines of the Tyrol and the Grisons. Surrounded on every side by lofty mountains, it has only one narrow opening connecting it with the Valteline, and apparently formed by the river Adda, which flows through it. This opening is named the Serra. The other accesses to Bormio lie across the rugged Alps, which at all times are difficult and toilsome, and in winter frequently impassable. This county, which is about 15 miles in length and 14 in breadth, is divided into five communities or districts; viz. Bormio, including the capital and several dependent villages; the valley of Furba; the valley of Pedinosa; the valley of Cepino; and the valley of Luvino. It formed once a part of the Valteline, from which it was disjoined about the end of the twelfth century, when it became a separate county. After having frequently changed masters, and sustained many destructive wars, it was at length reduced under the dominion of the Grisons, who made a conquest of it in the year 1512. In the new division of Switzerland, recently made by its French conquerors, the county of Bormio, with the Valteline, and Chiavenna, form a part of the Cisalpine republic.

The county of Bormio is, in general, very fertile. Its mountains, besides producing considerable quantities of wood, afford excellent pasturage for cattle; and its valleys yield luxuriant crops of grain. It would appear, however, that the rearing of cattle is the principal object of attention; for the inhabitants are obliged to import corn and other articles of provision from different countries. For their wine they are indebted to the Valteline; for corn, to the Tyrol; for corn and rice, to Milan; for linen, to Bergamo and Appenzel; and for cloth, to Germany. Their exports consist of cattle, cheese, and iron, which is obtained from the mines of Freli, in the plain of Pedinoso, wrought at the expence of a private individual, who enjoys all the profit, after paying a small annual rent to the community. The honey produced in Bormio is of the finest quality. The climate is keen, pure, and salubrious.

The established religion is Popery, nor is any other even tolerated. In spiritual affairs, the inhabitants of Bormio are under the jurisdiction of the bishop of Coire. Their priests are held in great reverence, and enjoy peculiar privileges, which extend even to those who wear the clerical habit. Before Switzerland was revolutionised by the French, most of the peasants possessed a small portion of land; and in consequence of the freedom of their government, were much happier than their neighbours of the Valteline and Chiavenna. Population 14,000. For further particulars relative to the former government of Bormio, the reader may consult the third volume of Coxe's *Travels in Switzerland*. See also *Dictionnaire de la Suisse*. (*μ*)

BORMIO, the capital of the above county, is beautifully situated at the foot of Mount Braglio, between the rivers Adda and Fredolfo. The internal appearance of the town is very paltry. The houses are built of plastered stone, and some of them would make a tolerable figure, were they not disgraced by the neighbourhood of others with paper windows, or with wooden window shutters in the style of the Italian cottages. The palazzo, or town-house, contains a suite of miserable apartments for the residence of the podesta, or chief magistrate, a chamber for the courts of judicature, and a room in which the representatives of the people assemble. There is here a chapter composed of an arch-priest and ten canons. The Jesuits have had an establishment in this town since the year 1612. About half a league from Bormio are the warm baths of St Martin Melina, in the valley of Premaglia, one of the quarters of the county. They are celebrated for their efficacy in cases of rheumatism, catarrhs, and apoplexy. East Long. 10° 21′, North Lat. 46° 17′. See Coxe's *Travels in Switzerland*. *Dictionnaire de la Suisse*. (*μ*)

BORN, Inigo, *Baron*, a celebrated German mineralogist, was born of a noble family at Carlsburg, in Transylvania, on the 26th of December 1742. At an early period of life he came to Vienna, where he studied in the college of the Jesuits, who, perceiving the talents of their pupil, prevailed upon him to enter into their order. After remaining a year and a half in this society, he went from Vienna to Prague, where, according to the custom of the Germans, he studied the law. Having completed his course of education, he set out on a tour through Hungary, part of Germany, Holland, the Netherlands, and France, and upon his return to Prague he began the study of natural history and mining, and was received in 1770 into the department of the mines and mint of that city. About the beginning of June 1770, Born set out on a mineralogical tour through the Bannat of Temeswar, Transylvania, and Hungary, of which he gave a detailed account in a series of twenty-three letters addressed to the celebrated Ferber, who published them in 1774. This work was translated from the German by R. E. Raspe, and published at London in 1777. In the first of these letters, dated Temeswar, 14th June 1770, he complains of the loss which he sustained in being ignorant of botany, owing to the want of public institutions in which this science might be taught. "Had I," says he, "besides my little mineralogical science, some knowledge in botany, my three days travelling over barren heaths, from Ofen to Segiden, and thence to Temeswar, might have perhaps procured me an opportunity to entertain you at least with the names and descriptions of some plants. But, alas! I am no botanist, though that is not my fault. You well know how fond I am of natural history: but I never met with any proper opportunity to improve in this part of science. Except at Vienna, there is no academy in all the Austrian States in which botany is taught; nay even at Vienna there is no professor of natural history. For this reason, you need not be astonished that natural history is entirely unnoticed and neglected in Austria, while the English, French, Swedes, and Russians, for the sake of useful science, examine their own and the remotest countries in the world. But to what purpose these complaints? You may guess by them the dissatisfaction that will attend me in my journey through the mountains of Bannat, Transylvania, and part of the Carpathian hills. All the riches of Flora, during the finest season of the year, displayed in those parts, will be scarce at all enjoyed by me."

Born continued his travels till the beginning of August 1770, when he had nearly lost his life by descending into a mine at Felso-Banya, which brought upon him a disease that embittered the remainder of his life. This accident is so well described in his letter to Ferber of the 22d August 1770, that we are induced to give it in his own words. "My long silence," says he, "is the consequence of an unhappy accident which was very near putting an end to my life. To examine the common firing of Felso-Banya, and the great effects produced by so small an expence of wood, I visited the great mine when the fire was hardly burnt down, and when the mine was still filled with smoke. An accident made me tarry somewhat longer in the shaft, by which the smoke went off. In short, I lost my senses, and fifteen hours after, I was restored to myself by blisters and other applications. My lips were swoln, my eyes run with blood, and my limbs in general lamed. Without the assistance of a skilful, young physician at Nagy-Banya, and the great care of the upper administration inspector Baron Gerham, in whose house I lodge, you would have been deprived of your friend; and the question is still, whether he is to be saved. A violent coughing, and acute pains in the loins, which alternately put me on the rack, are, I fear, more than sufficient to destroy this thinly framed machine. If that should be the case, then, my friend, I desire you to have my name at least inserted in the martyrology of naturalists." In this wretched state of health, Born travelled with great pain from Nagy-Banya to Schemniz, where he arrived in the beginning of September, and where his family at that time resided. Here he remained during the month of September; and in the beginning of October he set out for Vienna, partly for the purpose of obtaining medical assistance. In 1771 he went to Prague, where he was appointed counsellor of the royal mines in Bohemia, and where he published, in 1771, a treatise written by the Jesuit Poda on Mining Machinery. In 1772, he published his *Lithophylacium Borneanum*, or a catalogue of his collection of fossils, which he afterwards sold to the honourable Mr Greville for £1000.

The reputation of Born now began to extend, and he was honoured with the correspondence of some of the first mineralogists of the age. He was elected a member of the Royal Societies of Stockholm, Sienna, and Padua; and in 1774 he was chosen a fellow of the Royal Society of London.

The talents of Born were not confined to mineralogy alone. He had a taste for general literature, which he displayed, not only in his writings, but in the active zeal with which he laboured to inspire his countrymen with a taste for learning. He contributed largely to a work entitled *Abbildungen Bohmischer und Mahrischer Gelehrten und Kunstler*, or, *Portraits of the learned Men and Artists of Bohemia and Moravia*. He likewise wrote in the *Acta Literaria Bohemiæ et Moraviæ*. He induced government to form a public cabinet for the use of the students at Prague and Vienna; and, in 1775, he founded a literary society at Prague, which has published several volumes, under the title of *Abhandlungen einer Privatgesellschaft in Bohmen*, or, *Memoirs of a private Society in Bohemia*.

The fame of Born was now so great, that, in the year 1776, he was called to Vienna by the Empress Maria Theresa, to arrange and describe the imperial collection. In 1778, he published the conchology of this collection in a splendid work, the expense of which was partly defrayed by the empress herself. On the death of the empress the work was discontinued, in consequence of the parsimony of her successor, Joseph II. Some time afterwards, Born was chosen to instruct in natural history the Archduchess Maria Anna, for whom he formed an elegant museum. In consequence of these services, he was promoted to the office of actual counsellor to the

Born.

court chamber in the department of the mines and mint.

The accident which he had met with at Felsobanya now began to produce the most dangerous symptoms. He was attacked with the most excruciating colics, and having, in one of his paroxysms of pain, swallowed an immense quantity of opium, a lethargy was brought on, which lasted 24 hours. The disease now attacked his lower extremities; his feet withered by degrees, and he was unable to walk during the rest of his life.

It was about this time that the freemasons, forsaking the dark mysteries of their order, began to diffuse that light which had hitherto shone in their own lodges, and to take an active part in reforming the abuses and corruptions of society; and Born took an active and prominent part in all their measures. It is impossible to form any idea of a German lodge from those in our own country. The most distinguished literary characters frequented these meetings; and, instead of being regaled with good fare for their appetites, they were instructed by dissertations on history, ethics, and moral philosophy, or on the ancient and modern mysteries of the association. The corruptions of the Romish church, and the exactions of arbitrary power, were among the evils which this society pretended to discuss and reform. Into such societies a few desperate individuals may have gained admission, who were the enemies of all government and of all religion; but these men never directed the foreign lodges, and it never was the object of the German masons to overturn either the church or the state. In the reign of Maria Theresa, these meetings were discouraged; but, upon the accession of Joseph II. the freemasons received complete toleration, and Baron Born founded at Vienna the lodge called the *True Concord.* The dissertations which were read at the lodges were afterwards published in the *Journal sur Freymaurer*, or, *Diary for Freemasons*, and were also the foundation of another periodical work, entitled, *Physicalische Arbeiten der eintrachtigen Freunde in Wien aufgesammelt von Born.* Vienn. 1783–7; which was conducted by Baron Born and some of the other brethren of the order.

Born was also admitted a member of the Society of the Illuminati; and such was his zeal for the institution, that, when the elector of Bavaria ordered all in his service to renounce the order, Born sent back to the academy at Munich the diploma which he received when admitted among its members.

In the year 1783, when the emperor was making some reforms in the church, Born published a singular work entitled *Monachologia;* which is a severe satire on the monks, whom he describes in the technical language of natural history. This production is so full of admirable satire, that we cannot resist the temptation of laying before our readers the description of an animal, which, in the course of a few years, may be completely extinct.

MONACHUS.

Descriptio. *Animal avarum, fœtidum, immundum, siticulosum, iners, inediam potius tolerans quam laborem; vivunt e rapina et questu; mundum sui tantum causa creatum esse prædicant; colunt clandestine, nuptias non celebrant, fœtus exponunt; in propriam speciem sæviunt, et hostem ex insidiis aggrediuntur.*

Usus. *Terræ pondus inutile. Fruges consumere nati.*

In his description of the Dominicans, the same just and severe raillery is happily employed.

Eximio olfactu pollet, vinum et hæresin e longinquo odorat. Esurit semper polyphagus. Juniores fame probantur. Veterani, relegata omni cura et occupatione, gulæ indulgent, cibis succulentis nutriuntur, molliter cubant, tepide quiescunt, somnum protrahunt, et ex suis diæta curant, ut esca omnes in adipem transeat, lardumque adipiscantur: hinc abdomen prolixum passim præ se ferunt, senes ventricosi maxime estimantur, &c.

The justness of this satire was universally felt; and such was the sensation which it excited, that the archbishop of Vienna complained to the emperor, who replied, that the attack was made only upon the idle and useless part of the order. Being thus supported by Joseph, he published another satire, entitled, *Defensio Physiophili*, which was followed by his *Anatomia Monachi.* His satirical powers were likewise displayed upon Father Hell, the astronomer, who was a great enemy to the free-masons.

The Emperor Joseph at last withdrew his support from the reforming free-masons, and checked them with such restrictions, that they found it necessary to dissolve the society. The influence of Born, however, was not diminished. His great skill in mineralogy and metallurgy raised him high in public opinion, and was of great service to his country. Though the use of quicksilver, in extracting the precious metals from their ores, was long known, yet Baron Born was the first person who introduced it on a great scale. At the desire of the emperor, an experiment was made on a large quantity of ore at Schemniz, in presence of some of the first chemists and metallurgists in Europe. The success of the experiment, and the approbation which he received, induced him, in 1786, to publish his treatise on the Process of Amalgamation, illustrated by engravings of the necessary instruments and machinery.* This process was ordered by the emperor to be adopted in the Hungarian mines, and Born was remunerated for his discovery with one-third of the savings during ten years, and with 4 per cent. of this third part for the next twenty years. The success of this plan excited the jealousy of his enemies, who exerted every nerve in frustrating his views, and in defrauding him of his just reward. Besides the works which we have mentioned, Born published, in 1790, in 2 vols. his *Catalogue methodique raisonnée*, of Miss Raab's collection of fossils. He began a Latin work, entitled, *Fasti Leopoldini*, or a History of the Reign of Leopold II. and also a Treatise on Mineralogy; but he was suddenly seized in the midst of these occupations with violent spasms and cold, which put an end to his existence, on the 28th of July 1791.

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* This work was translated into English by R. E. Raspe in 1791, in 4to, under the title of "Baron Born's new process of Amalgamation of Gold and Silver Ores, and other metallic Mixtures."

Borneo.

"Born was of the middle size," says Mr Townson, "and delicate constitution, dark complexion, black hair, and long black eye-brows. Wit and satire, and a quick comprehension, were marked in his eyes, and his lively and penetrating genius appeared in his countenance. Besides being a good Latin classic, he was master of most European languages of note, and possessed a deal of general information no ways connected with those branches of science required in his profession. He was a great wit and satirist, and a good companion even under the sufferings of bodily pain. His house was always open to the travelling literati who visited Vienna; and unprotected genius was always sure to find in him a friend and patron. He carried this perhaps too far,—so far as to ruin his estate: Probably the expectations of receiving a large income from the amalgamation, made him less attentive to economy in his domestic concerns, though I believe his insolvency was chiefly owing to usurers and money-lenders, to whom he was obliged to have recourse to carry on his expensive projects. Thus, though his patrimony was very considerable, he died greatly in debt. This is the more to be lamented, as he left a wife and two daughters." See Dr Townson's *Travels in Hungary* in 1793, p. 410. Lond. 1797; and Born's *Travels through the Bannat of Temeswar, Transylvania, and Hungary*, in 1770. Lond. 1787. (π)

BORNEO, known likewise by the name of *Bona Fortuna*, the greatest and most important of the Sunda islands, which are Borneo, Sumatra, and Java, was supposed, before the discovery of New Holland, to be the largest island in the world. It has the Philippine islands on the north; Java on the south; Sumatra on the west; and Celebes on the east. It extends from the fourth degree of south latitude to the eighth degree of north latitude, and from 109° to 119° E. Long. It is about 780 miles in length; and its breadth, which is nearly equal throughout, except towards the north, is about 720 miles.

Climate.

The climate of this island is nearly the same as that of Ceylon. Its extensive forests, and the deep verdure of its fields, preserves a perpetual freshness in the atmosphere; it is exposed neither to hot land winds, as the coast of Coromandel, nor to such violent heats as prevail in Calcutta and Bengal. Here the land and sea breezes are always fresh; or if there be any variation from this general rule, it is occasioned only by particular circumstances which affect the atmosphere in all countries, such as the vicinity of marshes, or the free circulation of the air being prevented by the thickness of the forests.

Soil.

Few countries can boast of a more fertile soil than that of Borneo; yet such is the indolence and depravity of the inhabitants, that, in spite of the bounty of nature, they live in the most abject poverty. The air of Borneo is the best in all Asia; all the tropical fruits grow here in perfection, besides several other species scarcely known any where else, except at Sooloo, particularly the madang, which resembles a large apple, and the balono, which is not unlike a large mango. The northern part of Borneo is covered with forests of beautiful and very lofty trees, quite free of brushwood. These forests furnish the finest building wood in the world; a black wood, the root of which is very precious; a fragrant wood such as eagle-wood, ebony, and sandal-wood; besides trees which yield a great quantity of pitch and rosin. Several kinds of pepper are reared in this island, the most remarkable of which is the vatian, whose medicinal virtues are much celebrated. The plantations of pepper belong to the Chinese established in Borneo. They do not, according to the practice of the Sumatrans, conduct the pepper plant around the chinkareen tree; but they fix in the ground a large stake, which supports the plant, without robbing it of its proper nourishment. The Chinese keep the ground between the rows of plants extremely clear; and they often thin the leaves, that the clusters of pepper may be the more exposed to the rays of the sun. A single plant sometimes bears seventy or even seventy-five clusters, which is much more than is ever seen on the pepper plants of Sumatra; a fact which proves incontestibly, what indeed might be naturally supposed, that the chinkareen is extremely hurtful to the pepper tree. Borneo produces likewise abundance of aromatic plants, cassia, camphires, benjamin, and wax. It is thought that spiceries would succeed there well; and, indeed, there are several places in the island where the clove and nutmeg attain all their requisite flavour.

Animal productions.

Among the animal productions of Borneo several are peculiar and extraordinary, particularly the oncas, a species of apes, whose body is white and black, and from whose entrails is extracted the most perfect bezoar. The orang-outang is common in the forests of this island; and in some of them there are whole families, or rather flocks of red apes. There is likewise an animal sometimes to be seen here, the fur of which is almost the same as that of the beaver. With the exception of the sparrow hawk, there is no bird in Borneo which resembles those of Europe. The plumage of many of its birds is beautiful beyond description; its parroquets, in particular, have attracted the admiration of every traveller who has visited the country. Goats, swine, cows, horse, and buffaloes, are exceedingly common.

Minera

Borneo is scarcely less fortunate in its mineral productions than in the bounty of its soil. Its diamonds have been thought by some persons preferable even to those of Hindostan; though others maintain, that they are smaller than those of Golconda, and that any which are found of a large size, are yellow, and very imperfect. The most productive diamond mines of Borneo are at Ambauwang, beyond Molucco, in the district of Banjar-massin, and at Landac and Pontiana. Diamonds are likewise found in several of the rivers, and are fished up by divers in the same manner as pearls. This fishery is carried on chiefly in the months of January, April, July, and October. Four kinds of diamonds are distinguished by the natives; the white diamonds, which they call *verna ambon*, or white water; the green, which are called *verna loud;* the yellow, named *verna sakkar;* and a kind between the yellow and the green, which bear the name of *verna bessi*. Many of these diamonds are found from four to twenty-four carats, and sometimes even thirty or forty carats. The total amount of diamonds found in a year seldom exceeds 600 carats. In this island there are neo.

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likewise found several kinds of metals; iron, copper, tin, and gold. The gold is found chiefly in the state of dust mingled with the sand of rivers. It is said that gold-dust is not only more abundant, but much finer in Borneo than in any other part of the globe. There appears to be no silver in this extensive region; or the unskilful islanders know not how to explore and work the mines. Hence, if we may credit the accounts of some travellers, silver is exchanged in Borneo weight for weight with gold; or if we should suspect these accounts of being somewhat exaggerated, they must at least be admitted as a sufficient proof of the great scarcity of silver. In the northern regions of Borneo, there are numerous and very productive quarries of freestone. The centre of the island is occupied by an extensive ridge of mountains, which, from the great quantity of crystal they contain, are called the Crystal Mountains.

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At the foot of these mountains there is a large lake, which gives rise to all the rivers that traverse the island. Of these rivers, the most important are the Banjar-massin, Succatana, Lawa, Sambas, and Borneo. The river of Borneo is navigable far above the town of the same name, to vessels of considerable burden; the only difficulty is at the mouth, where the channel is narrow. For the length of a quarter of a mile, it is at the most about seventeen feet broad at high water; but the bottom is sandy and soft, and the river so completely enclosed between the banks, that a vessel which should run aground there, would be in little danger of being wrecked.

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On the coasts of Borneo, there is a species of sea-snail, called by the natives *swalloo*, which is esteemed a great luxury, and is a pretty lucrative article in their commerce with the Chinese. It is fished by the Biadjoos, the original inhabitants, in seven or eight fathoms depth of water. When the water is clear, they perceive the swalloo at the bottom, and strike it with an iron instrument having four points, fixed along a stone almost cylindrical, but narrower at one end than at the other, and about eighteen inches long. To the end of the stone, near the four prongs, they always attach a ball of iron. The swalloos are likewise procured by diving; the best being always found in the deepest water. The black swalloo is much preferable to the white; but there is a kind more esteemed than either, of a clear colour, and found only in deep water. Swalloos of this kind are sometimes so large as to weigh half a pound; and they are sold at China for forty Spanish dollars the pécul (somewhat more than the twelfth of a ton,) whereas the same quantity of white swalloos never brings more than four or five dollars.

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This island was at first wholly occupied by the Biadjoos, or Dajakkese; but the incursions of various nations from the continent of Asia, and the neighbouring islands, have obliged them to retire from the coasts, and to take refuge in the interior of the country. The coasts are now inhabited by Malays, Moors, Macassers from Celebes, and Javanese. These people are said to have once extended their dominions as far as Palawan, Manilla, and other parts of the Philippine isles, and even Sooloo is supposed to have formed at one time a part of the empire of Borneo. These distant conquests, together with some traditions current among the Borneans themselves, warrant the belief that they were originally a warlike people, but that they have experienced the fate of many other empires, which, after attaining a certain pitch of greatness, have relapsed into their original condition for want of an active and vigorous government, without which no foreign conquest can ever be preserved. At present they are sunk in the most listless indolence and inactivity, completely destitute of the enterprising courage of their piratical ancestors, and without the least influence over the states of the north of Borneo, which they had formerly subjected to their empire. Thus enervated and unwarlike, they are at the same time extremely envious of the private property of one another. Yet they are frank in their dealings, cool and deliberate in their resentments even when they have the power of revenge in their own hands, upright in their intentions, strangers to that polish and acuteness which is called a knowledge of the world, yet by no means deficient in native intelligence, which they have particularly displayed in the perfection to which they have brought the mechanical arts established among them, especially the foundery of bronze cannon: in this art they are superior to all the Asiatics. This character, however, must be understood as applying only to the inhabitants of some parts of the coast, and even of their character we have a darker side to contemplate. They are civilized and refined, indeed, compared with the Biadjoos, and the Idaans or Mooroots, yet they are not altogether free of the barbarities which characterise these rude and savage people.

Borneo.

Idaans and Biadjoos.

The Idaans and Biadjoos are the slaves of the most dreadful idolatry. It is one of their religious tenets, that their fate in a future life depends on the number of human beings whom they shall have slain in their combats, or in their ordinary quarrels, and that their happiness or respectability will then be proportioned to the number of human skulls which they have in their possession. The bloody heads which they have been so fortunate as to obtain in their skirmishes, are suspended over their doors as the most honourable trophies. In order to increase their number of these trophies, they frequently make secret excursions to the river Banjar, and surprise some small vessel belonging to Banjar fishermen. One or two of their unfortunate captives are then sacrificed to their dismal superstition. When they return with a head, all the inhabitants of the village in which they reside, men, women, and children, exhibit the most extravagant demonstrations of joy. Gongs, or musical instruments of copper, are beat by those who conduct the conqueror to his own house, where the women dance around him, and receiving from him the head, force into the mouth some meat and drink: this ceremony is followed by a banquet and dance, after which the head is hung up at the door. The arms of these savages are long knives, and the *soompihan*, which is a sarbacand or trunk of wood, across which they shoot small arrows poisoned at one end, and charged at the other with a small bit of cork, just thick enough to fill the tube. If one of these arrows only cut the skin, the wound brings inevitable death, unless there be immediately applied an antidote which they generally carry about with them, and which is said to be quite efficacious.

Marriage ceremonies.

Among the Biadjoos, as in most other savage nations, a person who is inclined to marry, makes it his first object to obtain the consent of the parents without once consulting the inclinations of his intended bride. Before he can succeed in his suit, he must have proved his courage by cutting off the head of an enemy; and when he is accepted by the parents, he carries to his bride a present, which generally consists of a male or female slave, two dresses, and a water-pot, adorned with some favourite figures. On the wedding-day both the parties give a feast at their respective houses; after which the bridegroom, in his best apparel, is conducted to the house of the bride, at the door of which is stationed one of her relations, who smears him with the blood of a cock, killed on purpose, and the bride is smeared, in like manner, with the blood of a hen. They then present to each other their bloody hands, and the solemnity is closed with a second entertainment. Polygamy is unknown among the Biadjoos; and when a wife dies, the husband cannot contract a second marriage till he has again cut off the head of an enemy as an expiation for the death of his wife. If the husband wishes to get rid of his wife, on account of any delinquency, he retains her clothes and ornaments, and makes her pay a fine, amounting to about thirty rials; and each party is then at liberty to marry. When a married woman has committed adultery, the husband, instead of taking vengeance on the adulterer, puts to death two or three of his slaves, and his ignominy is thus removed; the woman is in general punished only with words, though some husbands, more irascible, or more jealous of their honour, proceed to blows. Among the inhabitants of the coasts, the laws relating to marriage are quite different. Like all other Mahometans, they are allowed to marry several wives, though they rarely form alliances with strangers. The punishment of adultery is instant strangulation. The powerful and the wealthy, indeed, set this law at defiance; but it falls with extreme rigour on culprits in the middle or lower classes of the community.

Funeral ceremonies.

The funeral ceremonies of the Biadjoos partake of the same bloody character as the rest of their superstitious rites. When one of them dies, his body is put into a coffin, and kept in the house until the remaining males in the family have conjointly purchased a slave. When the body is burnt, the slave is beheaded, that he may attend the deceased in the other world; and before he is put to death, he receives strict injunctions to be faithful to his master. The ashes of the deceased, together with the head of the slave, are put into a watering pot, and deposited in a small edifice, or tomb, constructed for the purpose.

Laws.

Scarcely any regular form of government prevails among these barbarians. They have no sovereigns; but are ruled by chiefs, whose authority appears to be very circumscribed, and is supported by no written code of laws. Their trials bear a strong resemblance to the trials by ordeal which prevailed in Europe during the dark ages. If a person happened to be accused of theft, and no sufficient proof can be alleged against him, the culprit and the accuser are carried before one of the oldest inhabitants. An earthen pot, containing ashes and water, is placed on the ground; across the pot is laid a piece of wood, on which are put two small copper buttons. An oath is then administered to each party, and the piece of wood is turned round, so that the buttons fall into the water; the accused and the accuser take each one of the buttons, and he is deemed to have succeeded whose button appears as if scowered and whitened by the ashes.

Reli

The Biadjoos acknowledge a Supreme Being, whom they worship under the name of *Dewatta;* and to whom, as the creator, preserver, and ruler of the universe, they utter prayers for prosperity in this world, and happiness in the next. If it be considered part of their religious duty to resemble this deity in character, he must be a very gloomy and terrible being; for no nation on earth can equal the Biadjoos in their thirst for blood, and their propensity to revenge. Though they have no kings of their own, they recognise the sovereignty of the sultan of Banjar-massin, to whom they pay annually a tribute in gold dust to the value of 20 rials.

Trade of the Moors.

Banjar-massin.

The Moors, who have taken possession of the coasts of Borneo, are much more civilized, living under regular governments, and restrained by well defined and certain laws. Their territories are divided into several distinct kingdoms; Banjar-massin, Succatana, Landac, Sambas, Hermata, Jathou, and Borneo. The largest of these kingdoms, and the most important, on account of its connection with the Dutch East India Company, is that of Banjar-massin on the southern coast, (See BANJAR-MASSIN.) Cagu-Tangie was formerly the residence of the sultans of that kingdom; but, in the year 1771, the Sultan Sasuhannan transferred the seat of his court from that place to Martapura, where he caused a large city to be built, and a canal to be conducted through the middle of it; and, at the same time, he changed its name from Martapura to Bumie-Kintjana. The Dutch factory is situated at the end of the village of Tatas, or Banjar-massin. It is protected by a fort of an octagonal form, surrounded by palisades, and furnished, on the east side next the river, with three bastions, and with two on the west or land side. For the productions of the country valued in commerce, which are copper, gold, diamonds, canes, birds nests, wax, pedra del porco, dragons' blood, and iron, the Dutch give in exchange, agates, rings of red agate, different kinds of coral, coarse porcelain, silk of various colours, all kinds of cotton cloth, such as are worn by the Indians, various productions of Java, and opium, which, being prohibited by the sultan, is privately smuggled. At the town of Banjar-massin there is a manufacture, or, more properly, a dockyard, for junks; one of which, loaded with the commodities of the country, may be had at a very low price.

Succa

The kingdom of Succatana lies about *50'* south of the equator, having a little to the north the river Pontiana, which discharges itself into the sea under the line through several mouths. At the distance of about seven or eight miles from the sea the river separates into two branches. It has about twelve feet of water at its mouth, and at high water sixteen; so that small vessels can proceed, with great ease, up to the Company's factory.

ac.

On the northern arm of the Pontiana lies the kingdom of Landac, in north latitude 35′. Here the Dutch had a factory about a century and a half ago; but they were soon after completely driven out of their possessions, which they never recovered till the year 1778, when the king of Bantam, to whom Landac and Succatana then belonged, made a grant of these kingdoms to the Company. The Dutch had no sooner obtained possession of them, than they built a fort at Pontiana, between Landac and Succatana, and appointed Pangarang Saidja Nata regent of the whole district. From that time they have accounted these lands their own property, and the princes who govern them as their vassals. The capital of Landac, which is the residence of the prince, is situated on the projecting point of a mountain, to which there is an ascent by 118 steps. On the right and left of this mountain flow two rivers, so full of rocks as to be totally unnavigable, so that the place is, by nature, impregnable; and, to give it additional security, it is well furnished with artillery. Between Landac and Borneo there are several smaller kingdoms, as yet but little known; the petty sovereigns of which are vassals of the sultan of Borneo.

gdom orneo.

The civil government of the kingdom of Borneo is exercised by a sultan, and a superior council, composed of those pangarangs who are invested with the high offices of state: such as the *bandahara*, who is entrusted with the executive power; the *degadong*, or chamberlain of the sultan's palace; the *tomongong*, or general in chief of the armies; the *pamancha*, or judge in law pleas; and the *shabander*. The government of Borneo bears a very striking resemblance to the ancient feudal system which prevailed in Europe. The prerogative which the sultan enjoys, of naming, in his own right, all the great officers of state, will always, indeed, make his authority respected, and give him a great influence in the councils; yet every pangarang exercises an absolute power over his particular vassals, who never fail to espouse his cause, even though he should happen to oppose his sovereign. They have no particular laws against treason. Murder is punished with death, except in the case of a master killing his slave. Theft, according to the enormity of the offence, is either punished capitally, or by the amputation of the right hand. They have no positive laws relative to commerce; a defect which must be ascribed to their want of communication with any other nations except the Chinese, who pay to the chiefs of Borneo presents, which appear to be a kind of tribute. The Chinese who are settled here enjoy tranquilly the fruits of their industry; but those who carry on an occasional traffic are exposed to many hardships, from the want of laws to compel the debtor to discharge his debts, and from the necessity of yielding to the most unreasonable demands of those who are invested with authority.

guese

The Portuguese, who first discovered Borneo in 1526, wished to form a settlement on its coasts. As their military force was too insignificant to inspire terror into the natives, they endeavoured to secure the good will of one of the sovereigns of the country, by presenting him with some beautiful pieces of tapestry, on which human figures were very curiously wrought. The sovereign, conceiving these figures to be enchanted men, who might have some fatal designs against him, sent them back with horror, and expelled the Portuguese from the country. They soon after effected a settlement there, but were all massacred by the suspicious inhabitants. In the course of the 17th century, their merchants from Macao carried on a pretty free commerce to Banjarmassin; and even obtained permission, about the year 1690, to establish there a factory. Their counting-house was scarcely built, however, when it was pillaged by the Moors, who murdered the director and the commissaries, took their vessels of Macao in the harbour, and butchered the crews. This disaster effectually deterred the Portuguese from all further attempts to establish a commercial connection with Borneo.

Spanish settlements.

The Spaniards, established in the Philippine islands, were no less eager than the Portuguese to engross the commerce of Borneo. The port of Borneo, the ancient capital of the island, was for several years in their possession. They had concluded an advantageous treaty with the sultan of that kingdom; who engaged himself to shut the ports under his controul against all other European nations, and to make war against all the enemies of Spain. They found it expedient, however, to abandon that establishment, either because it was too distant from the Philippines, or on account of the rude treatment which they received from the Moors, who were no less cruel and suspicious than those of Banjar-massin.

Dutch settlements.

The bad success of the Spaniards and Portuguese, did not deter the Dutch from attempting to form settlements on an island which seemed to combine so many commercial advantages. They, at first, succeeded in establishing factories at Borneo, Sambas, and Succatana. But the persecutions of the Moors forced them likewise to abandon these inhospitable coasts; nor do they seem to have ever revisited them till the year 1748, when they appeared off Banjarmassin with a squadron, which, though feeble, so overawed the sultan, that he granted them the exclusive commerce of pepper, with this single exception, that he should be permitted to deliver 500,000 pounds of that commodity to the Chinese who frequented his harbours. The advantages which the Dutch derived from this commerce scarcely counterbalanced the expense of the establishment.

English settlements.

The English, like the Dutch, were tempted, by the advantages which Borneo held out, to brave all the dangers which other Europeans had experienced in endeavouring to settle on its coasts. They, accordingly, began by establishing a colony at Succatana; which, like all their predecessors who had made the same attempt, was compelled to leave the island in 1694. A short time after that, however, they were received at Banjar-massin; where, with the assistance of two hundred Indian families, who placed themselves under their protection, they rapidly formed a very flourishing colony. The Moors, envious or afraid of the growing prosperity of this factory, were approaching one day to plunder and destroy it, when the captain of an English vessel, who had come by accident to Banjar-massin, dispersed the barbarians, and pursued them along the river as far as Nagra, about sixty leagues from the mouth of the Banjar. The factory was no longer molested by the natives; but the English, destitute of money and of victuals, were obliged to abandon it. They returned, however, in 1704, with a fleet of several ships, which enabled them to give law to the islanders. Captain Barr was ordered to take the direction of that establishment, and to build a fortress upon the banks of the Banjar. Alarmed by that undertaking, the Moors advanced upon the river with a numerous flotilla to attack the factory; but Barr, proceeding against them with a single vessel, terrified them to such a degree by the fire of his artillery, that they fled in all directions.

The death of that brave and active man, in 1706, was immediately followed by the total destruction of the English factory. Cunningham, his successor, was a mean and dastardly wretch, afraid to encounter the slightest danger, and unable to provide against the most trifling contingency. The Moors, no longer kept in awe by the name of Barr, again appeared in arms before the fortress; when its infamous governor, without making one effort to defend it, embarked with all the garrison, and set sail for England, abandoning, to the discretion of the enemy, not only all the goods and ammunition of the factory, but a number of workmen and slaves attached to its service. The Moors pillaged and sacked the fort, massacred all the Indians whom they found there, and, soon after, drove from Tamborneo, at the southern extremity of the island, a remnant of English who had settled in that quarter. Such was the disgraceful manner in which the British colony in Borneo was completely destroyed.

They again attempted, in 1766, to form a settlement in the island of Balambangan, at the northern extremity of Borneo, which was ceded to them by the king of Soloo. They stationed there a few Europeans, and a garrison of 300 soldiers, Europeans and blacks, and designed to establish a factory, where they might exchange the productions of Europe and Hindostan for those of China and the Indian islands; but, in the year 1772, their garrison was greatly reduced by contagious diseases, and the fort which they had constructed being badly fortified, was suddenly attacked, and the whole establishment was destroyed. Yet the English have still a factory at Borneo, and are masters of all the northern coast of the island, which was delivered up to them by the Soloos, who had conquered it. The places ceded to the English to the south of Pirates Point are, Pandassan, Tampassook, Abia, Amboug, Salamau, Tawarran, Juannan, and Palatan as far as Keemanees. In this extent of coast there are some good harbours; and it is much more populous than the country north of Pirates Point, which extends a little beyond the spacious harbour of Sandakan as far as Towson Abia, where the English possessions in this island terminate.

Mr Dalrymple, in a plan which he has given for forming an establishment at Balambangan, expresses his conviction, that the Idaans, if they were well treated, would eagerly crowd in from all quarters, to place themselves under the protection of any Europeans who should settle in their neighbourhood. His opinion is supported by Mr Forrest, a very judicious navigator; who adds, that if an English establishment should be formed in that quarter, these people would supply them abundantly, by their different rivers, with pepper and rough materials for exportation, besides the precious articles of gold and diamonds; not to mention the great advantages which a free commerce between this island and Hindostan would afford to Bengal and Bombay. There might be there trained a race of Lascars, or mariners, who would employ a great number of vessels; because the commodities which are exchanged for the salt and embroidered cloths of Hindostan are of great bulk. These Lascars, mingled with an equal number of English seamen, would fight a vessel well, as has been often experienced in India, especially on the coasts of Malabar. Another advantage resulting from this establishment would be, the ready communication which it would open with Cochin-China, and other places on the eastern shores of the China seas. As the track is nearly north-west or south-west, every trade wind would furnish a favourable gale for sailing thither from Borneo or Balambangan, and even for returning; and Cochin-China would afford a ready market, not only for woollen stuffs, but likewise for the cottons of India, and particularly the muslins of Bengal.

China trade.

Long before Borneo was known to Europeans, the Chinese had established an extensive commerce with that island, which they still continue. This commerce resembles, in some measure, the trade of Europe with America. The Chinese export from Borneo great quantities of wood, which they employ for making furniture, and which they purchase for about two dollars the pécul, and sell for five or six. They likewise export junks, a kind of resin, cloves, swalloos, tortoise shells, birds nests, and camphor, which is much superior even to the camphor of Sumatra. A great proportion of this precious drug comes from those districts of Borneo which have been ceded to the English by the Soloos. In return for these commodities, the Chinese import every description of their national manufactures or workmanship, and keep open shop, not only on shore, but likewise on board their junks.

The bay of this island is very spacious, and has a gulf in the form of an arm of the sea, interspersed with several islands. The water is every where deep, and is never more agitated than a lake or a river. See *Transactions of the Batavian Society; Merkwurdigkeiten aus Ostindien;* Valentyn's *General Description of India;* Salmon's *Present State of all Nations;* Prevost's *General History of Voyages; Oriental Repertory;* Forrest's *Voyage, &c.;* and Peuchet's *Dict. de la Geog. Commerç.* (*k*)

BORNEO, a sea-port town in the island of Borneo, and capital of the kingdom of the same name, is situated about ten miles from Pulo Chirming, on the north-west side of the island. It consists of about 300 houses, built upon piles along the two banks of the river Borneo, and the houses are entered by ladders and stairs. On the left, the houses stretch towards the land, upon a narrow point or cape. There is little communication from house to house by land, because there is no road, and the ground is very marshy; the intercourse is principally carried on by boats and sloops on the river. On the right, the houses advance half a mile into the land, with canals, in the form of streets, between their rows. It appears as if, before the houses were built, the river formed here a large but shallow basin, on which have been erected three-fourths of the town, which, in that circumstance, resembles Venice, with a great number of streets of water, so to speak, at right angles, and parallel to the river, which is here as large as the Thames at London bridge, with six fathoms of water in its channel. In these divisions of the town by canals there is neither firm land nor island, the houses being entirely built on piles in shallow water. The public market is held sometimes in one place, and sometimes in another; and consists of a number of boats loaded with the necessaries of life, and the various articles of merchandise, and crowds of purchasers rowing up and down the river. (*k*)

BORNHOLM, the most eastern of the Danish islands in the Baltic, is situated between Scania and Rugen, about 16 miles from the extremity of Zealand. It is about 6 miles long and 3 broad, and extends from north north-east to south south-west.

Though the soil of Bornholm is rather stony, yet it produces all sorts of grain. From the excellence of the pasturage, the inhabitants export a good deal of butter, and rear a considerable number of sheep, the wool of which is spun and used in the island.

Bornholm abounds with excellent pasture, which is superior to that of Gothland and Bremen; and it possesses also a kind of coal, which is equal to the coal of this country. Clay proper for potteries, and particularly useful in the manufacture of porcelain, is also found here. In a kind of globular stone common in Bornholm, are found small crystals called diamonds of Bornholm.

The inhabitants of this island have a peculiar method of curing and smoking salmon, which are sent to Copenhagen, and are held in high estimation. Herring and cod are caught in great numbers.

There are no fewer than six little towns in this island, of which Sandewick is the principal. Large farm-houses are scattered over every part of the island, which renders it extremely populous. The inhabitants are proprietors of the soil, and are remarkably jealous of their rights and privileges. Population 30,000. E. Long. 15°, N. Lat. 55° 10′. (*w*)

BORNOU, an extensive empire in the interior of Africa, situated to the south-east of Fezzan, and bounded on the north by the desart of Bilma; on the west by Nubia, Kuka, and Tagua; on the south by Kanga and Begermee; and on the east by Cassina, Zegzeg, and Zanfara. This country, which extends from the 26° to the 22° north latitude, is numbered by the Mahometans among the four most powerful monarchies in the world,—the other three are Turkey, Persia, and Abyssinia. Bornou is the name by which it is known among the natives, but it is called by the Arabs, Bernou, or Bernoah, the land of Noah, because they believe that it was on the mountains of this country that the ark rested after the deluge.

Bornou.

The climate of Bornou, as might be expected from the position of the country, is excessively, though not uniformly, hot. The year is divided by two seasons, the first of which, commencing about the middle of April, is introduced by violent winds from the south-east and south, bringing with them an intense heat, a deluge of sultry rain, and tempests of thunder and lightning, which destroy multitudes of the cattle, and not a few of the people. The rainy period continues from three to nine successive days with short intervals, from the occasional shifting of the wind to the north or west. During this period, the inhabitants confine themselves closely to their dwellings; but the rest of the first season, however sultry or wet, does not suspend the labour of the fields. With the commencement of the second season towards the end of October, the ardent heat subsides; the air becomes mild; the weather continues serene; and, as the year declines, the mornings, before sunrise, are unpleasantly cool.

Soil and agriculture.

The soil of Bornou is, in general, amazingly fertile, though frequently interrupted by stripes of barren sand. The grain, which is principally cultivated there, is the Indian corn, of two different kinds, distinguished by the names of the gassob, and the gamphuly. The gassob, which, in its general shape, resembles the common reed, is of two species; the first grows with a long stalk, that bears an ear from eight to twelve inches long, and containing, in little husks or cavities, from 300 to 500 grains, of the size of small pease. The second species, which is common in Tripoli, differs from the first only in the shorter size of its ear. The stalk of the gamphuly is much thicker than that of the gassob; its ears are more numerous, for it has several on the same reed, and the size of its grain is considerably larger. This is the same kind of corn which is frequently seen in Spain, and which is there called maize. Wheat and barley are not raised in Bornou; but the horse-bean of Europe, and the common kidney-bean, are cultivated with much assiduity, as they are used for food both to the slaves and to the cattle. Gum trees are thinly scattered throughout the country. Cotton, hemp, and indigo, are produced in great abundance. In the agriculture of Bornou, the plough is unknown, and the hoe is the only instrument employed. In the labour of husbandry, the men are always assisted by the women. While the former open the ground with their hoes, and form the trenches in straight parallel lines, the women follow and throw in the seed, and as soon as the weeds begin to rise where the grain has been sowed, it is their business to root them up with the hoe. The sowing season commences when the periodical rains of April have ceased; and so rapid in that climate is the vegetation, that the gassob is reaped early in July; but the gamphuly, of slower growth, is seldom cut down till the month of August or September.

Food of the inhabitants.

Besides the vegetable productions already mentioned, two species of roots are used by the inhabitants of Bornou, which constitute a wholesome and substantial food. The one called *dondoo*, produces a low plant, with branches that spread four or five feet upon the ground, and leaves resembling those of the garden-bean. In five months, after it has been planted, the leaves fall off, and the root is taken from the ground, and being cut into small pieces, is dried

Vegetables.

in the sun, in which state it may be kept for two years. Before being used as food, it is reduced to a fine powder, and mixed with palm oil till it assumes the consistency of paste. The other root is that of a tree, with the name of which we are unacquainted. It is prepared for use by boiling, without any further process.

Fruits.

The fruits of Bornou are as delicious as they are abundant. The most common species are grapes, apricots, and pomegranates, lemons, limes, and water and musk melons. There is a valuable tree called the Kedeynah, indigenous, and, as far as we know, peculiar to this country, in form and height resembling the olive, and the lemon in its leaf, and bearing a nut, of which the kernel and shell are both in great estimation, the first as a fruit, the last on account of the oil extracted from it, which the people of Bornou burn in their lamps as a substitute for the oil of olives.

Animals.

The supply of animal food in Bornou, is even more ample and varied than its vegetable stores. Innumerable flocks of sheep, and herds of goats and cows, with amazing numbers of horses, buffaloes, and camels, (the flesh of which is highly esteemed,) brouze on the vales and the mountains of this favoured country. The common fowl is also reared by the inhabitants; and their bees are extremely numerous. Their game consists of the huaddee, and other species of antelopes, the partridge, the wild duck, and the ostrich, the flesh of which they prize above every other. Their other wild animals are the lion, the leopard, the civet cat, the small wolf, the fox, the wild dog, with which they hunt the antelope, the elephant which is rare, and of which they make no use, the crocodile, the hippopotamus, and a large and singular animal called Zarapat, which is described as resembling the camel in its head and body, as having a long and slender neck like the ostrich, as being much taller at the shoulder than the haunches, and as defended by so tough a skin, as to furnish the natives with shields that no weapon can pierce. Like all countries in similar latitudes, Bornou is much infested with dangerous or loathsome reptiles, especially snakes and scorpions, centipedes and toads. The camel, the horse, the ass, and the mule, are common throughout the country; the dog which they employ in hunting their game, appears to be their only domestic animal.

Architecture.

In Bornou, the houses are similar in form to those of Tripoli, and throughout the whole empire the same mode of building prevails. Four walls inclosing a square, are first erected; within these, and parallel to them, are built four other walls; the intervening space is then divided into different apartments, and covered with a roof. Thus the space within the interior walls determines the size of the court; the space between the walls determines the width of the apartments; and the rooms are of the same height as the walls. On the outside of the house there is usually a second square or large yard, surrounded by a wall, for the accommodation of the cattle. In the construction of the walls, the following method is invariably adopted: A trench being made for the foundation, is filled with dry and solid materials, rammed in with force, and levelled; over these is placed a layer of tempered mud or clay, in which are regularly fixed a proper number of stones. Thus with alternate layers of clay and stones, the wall is raised to the height of six or seven feet, when the workmen suspend its progress for a week, that it may have time to settle, and become compact; for which purpose they water it every day. The roofs are formed of branches of the palm-tree, intermixed with brushwood, and covered with layers of earth, in such a manner as at first to be water proof, though the violence of the wind and rain generally destroys them before the end of the second year. The whole building is white-washed with a species of chalk.

Town

Though the symmetry of the houses, and their general resemblance to each other, would easily have admitted of a regular arrangement of streets, yet all the towns of Bornou consist of houses straggling wide of each other, and placed without method or rule. "The obvious propriety of giving to the principal mosque a central situation, exhibits the only proof of attention to general convenience." The towns, in general, have no external defence; but Bornou, the capital, is surrounded by a wall of fourteen feet in height, the foundations of which are from eight to ten feet deep, and which seems to be very firmly built. A ditch surrounds the whole; and in the wall there are four gates, opening to the east, west, north, and south, which are carefully shut every evening at sunset, to protect the inhabitants from any sudden surprise.

Furni

Less attention is paid to the furniture of the houses than to their structure. Among the lower classes, the only articles of furniture are mats covered with a sheep skin, upon which they sleep, an earthen pot, a pan of the same kind, two or three wooden dishes, two wooden bowls, an old carpet, a lamp for oil, and sometimes a copper kettle. Besides these utensils, the richer inhabitants possess leathern cushions stuffed with wool, several brass and copper vessels, a handsome carpet, and a sort of candlestick; for instead of vegetable oil, which is used by the common people, they employ the light of candles manufactured from bees wax, and the tallow of sheep.

Popula-
tion.

The wide dominions of Bornou are peopled by a countless multitude, among whom no fewer than thirty different languages are spoken. The language which prevails in the capital, bears a strong resemblance to that of the neighbouring negroes; but the nobles and principal families converse in Arabic. They are acquainted with the art of writing, and are taught to express the Bornou tongue in Arabic characters. The natives are represented as singularly courteous and humane. They will not pass a stranger on the road without stopping to salute him; their houses are ever open for the reception of visitants; and their sharpest quarrels are mere contests of words. Passionately fond of the amusement of drafts, they often sit down upon the ground, and forming holes to answer the purpose of squares, supply the place of men with dates, or the meaner substitute of stones, or camel's dung. On the event of a game, they stake their whole property, sometimes even their clothes; and as the bye-standers constantly take sides, and obtrude their advice, the whole groupe presents the most ludicrous scene of violent gesticulation and clamorous abuse. Persons of superior rank devote themselves to chess, in which they are said to be eminently

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skilled. The sultan of Bornou, and his court, profess the Mahometan faith; but the majority of the people adhere to the idolatrous superstitions of their fathers.

The monarchy, as in the empire of Bathna, is elective; but the election is confined to the royal family. On the death of a sovereign, the privilege of chusing a successor among his sons, without regard to priority of birth, is conferred by the nation on three of the most distinguished men, whose age and character for wisdom are denoted by their title of elders, and whose conduct has entitled them to the public esteem. Limited in their choice by no other restriction than the necessity of electing the most worthy, they retire to an appointed place, the avenues to which are carefully guarded by the people; and during their deliberations, the princes are confined in separate chambers of the palace. When their choice is determined, they proceed to the apartment of the sovereign elect, and conduct him in silence to the place where the corpse of his father, which cannot be interred till this awful ceremony is passed, awaits his arrival. There they expatiate freely on the character of his departed parent, and conclude with this awful warning, "You see before you the end of your *mortal* career; the *eternal* which succeeds to it, will be miserable or happy, in proportion as your reign shall have proved a curse or a blessing to your people." The new sovereign is then brought back to the palace, amidst the loud acclamations of the multitude, and is invested by the electors with all the slaves, and two-thirds of all the lands and cattle of his father; the remaining third being always kept as a provision for the other children of the deceased monarch.

Fatal dissensions in the royal family, are the almost inevitable consequences of this mode of election. As soon as the sovereign is invested with the ensigns of royalty, such of his brothers as have reached the age of manhood, prostrate themselves at his feet, and rising, press his hands to their lips in testimony of their allegiance. If their sincerity be doubted, either by the king or the elders, they are either removed by death, or doomed to perpetual imprisonment: when they are not suspected, they receive from the reigning monarch a liberal allotment of lands and cattle from the possessions of their father, together with presents of slaves. Such of the princes as are too young to receive their proper portion of their father's property, are educated in the palace, till they arrive at the years of maturity, at which time their respective shares of land and cattle are assigned them. It often happens, however, that the most popular, or the most ambitious of the rejected princes, veiling his designs under the affectation of zealous attachment, creates a powerful party, and, assured of foreign aid, prepares in secret the means of revolt. "But stained with such kindred blood," says the writer who has drawn up the account of Bornou from Mr Lucas's communications, "the sceptre of the victorious rebel is not lastingly secure—one revolution invites and facilitates another; and till the slaughter of the field, the sword of the executioner, or the knife of the assassin, has left him without a brother, the throne of the sovereign is seldom firmly established."

Revenue.

In Bornou, as in every Mahometan empire, the administration of the provinces is committed to governors appointed by the crown; and the expences of the sovereign are defrayed partly from his hereditary lands, and partly by taxes levied on the people. The monarch of Bornou is not, like the sovereign of many neighbouring kingdoms, the executioner of the criminals whom his own voice has condemned; but commits the care of executions to the cadi, who directs his slaves to strike off the head of the prisoner.

Military force.

The military force of this empire consists chiefly of cavalry, armed with the sabre, the lance, the pike, and the bow, and defended by shields of hides. Fire arms, though not entirely unknown to them, are too difficult to be procured for common use. When the sultan levies an army for the purpose of taking the field, he is said to have a custom of causing a date tree to be placed as a threshold to one of the gates of his capital, and commanding his horsemen to enter the town one by one, that the parting of the tree in the middle, when worn through by the trampling of the horses, may serve as a signal that the levy is complete.

Appearance and dress of the inhabitants.

The inhabitants of Bornou, though composing so many different nations, are alike in their appearance, having a black complexion, but features different from those of the negroes. Their dress consists of a girdle for the waist, a turban, consisting of a red woollen cap, surrounded by folds of cotton, together with a loose robe of coloured cotton, of a coarser kind.

Manufactures and commerce.

The only manufactures known in Bornou are coarse linen, made from the hemp of the country, and calicoes and muslins woven in pieces of about nine inches in breadth, and varying in length from fifteen to twenty yards. These cotton manufactures, when enriched with the blue dye of the country, which is preferable to that of the East Indies, are valued more highly than silk. They also manufacture a species of carpet, which they use as a covering for their horses; and a coarse cloth from wool, mixed with the hair of goats and camels, of which they make tents for the use of the army. The little silver they have is converted by their own artists into rings; and from native iron ore they fabricate, though unskilfully, such tools as are employed in their rude husbandry. Their articles of exportation are gold-dust, slaves, horses, ostrich-feathers, salt, and civet; in return for which they receive copper and brass, which are brought to them from Tripoli, and are used as the current species of Bornou; imperial dollars, which are likewise brought from Tripoli by the merchants of Fezzan, and are converted by the artists of Bornou into rings and bracelets for their women; red woollen caps, which are worn under the turban; check linens; light coarse woollen cloths; baize, barakans, small Turkey carpets, and plain Mesurata carpets. See *Proceedings of the African Association*, chap. vi. and xii.; *Discoveries in Africa*; and Browne's *Travels in Africa*. (*k*)

BORNOU, the capital of the above empire, is situated about 600 miles south-east of Morzouk, and 420 miles west of Sennaar. It is a town of greater extent than Tripoli; but the houses are so irregularly placed, that the spaces between them have no appearance of streets. The king's palace, surrounded with high walls, forms a kind of citadel, and is built in a corner of the town. Provisions are sold in public markets within the city; but for other articles, a weekly market is held, as in Barbary, without the walls. Near this city there runs a small river, which falls into the Bahr-el-gazalle. East Long. 23° 10′, North Lat. 19° 45′. (*k*)

BOROUGH, or Burgh, (Sax. *Borge*, *Borgh*, or *Borhoe*; Germ. *Burg*; Lat. *Burgus*,) is a term frequently used to denote a corporate town, which is not a city; but, at present, it is more commonly applied to a town, whether corporate or not, which possesses the privilege of sending representatives to Parliament.

By some etymologists and antiquarians, the term *borough* is supposed to have been primarily applied to a *tything*, or small community, consisting of ten families, who were mutually bound as pledges for the good behaviour of each other; and this conjecture derives some plausibility from the subdivision of the counties in England into hundreds, and tythings, or towns, which appears to owe its origin to Alfred, (Hume's *Hist.* ch. ii.), and from the similarity of the term to the word in the Teutonic dialects, (*bürge*, *bürg-shaft*,) signifying, pledge or security. In fact, these tythings, decennaries, or fribourgs, afterwards received the name of *frank-pledges*. It may be observed, however, that, to this day, the word *burg* in the German language, signifies a castle or place of strength; which seems to confirm the observation of Verstegan, that the term *borough* denotes a town, having a wall or some kind of inclosure about it; so that all places which, among our ancestors, had the denomination of borough, were, in one way or other, fenced or fortified. Indeed, it is evident, that, at the period when towns began to be formed in modern times, they must either have been in some manner fortified themselves, or placed within the protection of a nobleman's castle or residence.

But, leaving the obscure labyrinth of etymological conjecture, it is of more importance to inquire into the origin and progress of towns and communities, which have had such a decided influence on European government.

During the wild and lawless periods which immediately succeeded the subversion of the Roman empire, the proprietors of land, (that is, the nobility,) seem generally to have lived in fortified castles on their own estates, in the midst of their tenants and retainers. Many other individuals, too weak, singly, to defend themselves against the restless and rapacious spirit of the feudal chiefs and their dependants, sought protection from the caprice and violence of their more powerful oppressors, by combining together, and inhabiting within the precincts of some fortified place. There they industriously cultivated the useful arts and manufactures; and when united in such situations, were the more easily enabled to defend their persons and properties against the attacks of invaders. For some time, however, their political condition was but little different from that of the enslaved peasantry. They were, for the most part, obliged to court the protection or patronage of some powerful prince, nobleman, or ecclesiastic, near whose castle or residence they had established themselves; under whose clientship they accordingly stood, and to whom they were obliged to pay a considerable annual tribute, as the price of the protection which they enjoyed. Some conception may be formed of the degraded state in which the inhabitants of towns were then placed, from an enumeration of the privileges which were afterwards successively conferred upon them. The people, as Dr Smith observes, (*Wealth of Nations*, b. iii. ch. 3.) to whom it is granted as a privilege, that they might give away their own daughters in marriage without the consent of their lord; that, upon their death, their own children, and not their lord, should succeed to their goods; and that they might dispose of their own effects by will; must, before these grants, have been either altogether, or very nearly in the same state of villanage with the occupiers of land in the country.

There were other analagous causes which also contributed to the increase of towns, during the dark ages. In those turbulent times, when law and government were only respected, in so far as they were seconded by the immediate application of constraining force, the princes of Europe found it extremely difficult to protect their remote subjects, and particularly those who inhabited the frontier provinces. On this account, they found it necessary to encourage the formation of towns, which should at once serve as a protection against domestic disturbances, and as a bulwark against foreign invasion. In Germany, for instance, in addition to the towns which already existed, the Emperor Henry I. founded several others in Saxony, Thuringia, &c. which he caused to be fortified; and, at the same time, conferred upon the inhabitants several important privileges. The same policy was pursued by his successors, and their example was imitated by the nobility. In England, even the principal cities appear, by Domesday-book, to have been, at the time of the conquest, little better than villages: but under the first princes of the Norman line, the towns and boroughs gradually rose to importance; and in the reign of King Henry II. they were so highly privileged, that if a bondman or servant remained in a borough a year and a day, such residence entitled him to the rank of a freeman.

During the 12th and 13th centuries, a remarkable revolution took place, in regard to the condition of towns, which powerfully operated upon political government, throughout the whole of Europe. This slow and silent revolution was partly a natural consequence of the riches acquired by the inhabitants of towns, by their application to industry and commerce, and was also partly owing to a new line of policy which the princes of Europe found it expedient to adopt. They had, at first, endeavoured to make use of the influence of the clergy, in order to repress the overgrown and formidable power of the nobility; but having, at length, gradually lost the greater part of their authority over the church, they were forced to look round for some other means of diminishing the weight of their powerful vassals. Such a counterbalance naturally presented itself in the increasing wealth and importance of the towns, and accordingly we find, that during the period above mentioned, the inhabitants of towns began, by degrees, to emerge out of that state of dependence and degradation in which they had hitherto existed, and at length to exert an influence on the affairs of government. Some of them asserted their independence by main force, others obtained it from their needy lords in consideration of a sum of money, and all were desirous of securing it by royal charters. This revolution in the political state of the towns began in Italy at the commencement of the 11th century. In France, Louis the Fat, who commenced his reign in 1108, was the first of the French kings who granted corporate privileges to the towns of his demesnes, either from views of political expediency, or from more mercenary motives; and his subjects followed his example. The greater part of these charters are of the 12th or beginning of the 13th century. The reader will find a long list of them in Du Cange's Glossary, v. *Commune.* In Germany, the emperor Henry V. was the first who adopted this line of policy; and the measures which he and his successors pursued, gave rise to that powerful body of towns, which, as long as the German constitution remained entire, formed a distinct college or chamber at the imperial diet. The enjoyment of liberty and security gave a spur to the industry of the towns, and their population increased with their wealth. These communities had now an independent political existence, and were at length admitted to bear a part in the national councils. The example was given by England during the reign of Henry III. It was followed by France in the reign of Philip the Fair; and by Germany under the Emperor Henry VII. But in no country has this system been pursued to such extent, or attended with such salutary practical effects, as in England.

It has been a question acrimoniously disputed, among our learned antiquaries, at what period the representatives of boroughs were first called to take a share in the national councils. Some have endeavoured to trace their origin as far back as the Saxon *Wittenagemote:* Others, on the contrary, have maintained, that the commons formed no part of the great council, till some time after the conquest. This controversy we are certainly inclined to consider as more curious than important. If the system of popular representation be of great antiquity, and if it be in itself salutary and expedient, it really appears to us to be a matter of very little consequence, whether its origin is to be dated from a more barbarous, or from a more civilized age. At the same time, we conceive it to be our duty to present our readers with a summary of the arguments by which the advocates of either side of the question have endeavoured to support and illustrate their opinions. Those who are desirous of enquiring more minutely into the merits of this controversy, may consult the volumes to which we refer them at the end of this article.

The advocates of the higher antiquity of the commons maintain, that their origin is to be traced to the original customs of the ancient German nations, among whom, according to Tacitus, (*de Mor. Germ.* c. 25.) all the freeholders enjoyed an equal right with the nobles to assist in important deliberations. This right they exercised, upon their first settlement in foreign countries, by assembling together in open plains; and this is asserted to have been the practice among the Anglo-Saxons, the meadow near Staines, in which King John granted the great charter, being called Runemeed, or the Meadow of Council, because in ancient times it had been usual to meet there, and consult upon business which concerned the peace of the kingdom. This custom, it is said, had gone into disuse under, and even previous to, the Norman government; and the meeting in the reign of King John is the only instance of its having been revived. From a record cited by Dr Brady, so late as the fifteenth year of King John, it appears, that not only the greater barons, but all the inferior tenants in chief of the crown, had a right to be summoned to Parliament by particular writs; from which it is concluded, that till then, they had attended the great councils of the nation personally, and not by representatives. But these did not constitute all the freeholders of the kingdom; for this description comprehended all who held of the barons, either by knight service, or free soccage, all the possessors of allodial estates, and all the free inhabitants of cities and boroughs not holding of the crown. Was that numerous class of men altogether excluded from Parliament, or were they present by any kind of representation? It has been supposed by some learned writers, that every superior tenant of the crown gave an opinion on matters of government, which bound all his vassals. But in this case, the allodial proprietors could not have been represented, nor, consequently, bound by the acts of the barons, to whom they were not attached by any feudal tie. Upon the above hypothesis, too, the right of the barons to sit in Parliament arose wholly from their tenures, and not from any trust conferred upon them by the people. It is certain, however, that the feudal superiority was the same under the government of Henry III. as under that of William the Conqueror. If, therefore, the barons, and superior holders of great feifs of the crown, had, by virtue of the institutions of William I. been supposed to represent their vassals in Parliament, and the notion then was, that every inferior feudatory was bound by the parliamentary acts of his lord; how came that notion to be discarded in the 49th year of Henry III., to which period this change has been referred. An existing record, it is said, demonstrates this date to be false. A writ of summons, directed to the sheriffs of Bedfordshire and Buckinghamshire, and requiring two knights to be sent for each of these counties, is extant in the close roll of the 38th year of Henry III. And there is also a clause in the great charter of the 9th of the same king, whereby it is declared, that, together with the spiritual and temporal lords, other inferior freeholders, *et omnes de regno*, by which, it is alleged, we are to understand, "the whole commonalty of the realm," granted to the king the fifteenth part of all their moveable goods, in return for the liberties acceded to them in that charter. We have no reason, it is observed, to presume, that so great an alteration was then first made in the constitution of England. Such an innovation must have produced disputes, which would have been noticed by some of the numerous historians of that age. But the English history is altogether silent as to any disputes between the nobility and the people, on this account, from the earliest periods of the Saxon government down to the reign of Charles I. Hence it is concluded, that the right of the commons must have been incontestibly established by custom, and interwoven into the original frame of our constitution. Again: If we suppose, with some, that the sitting in Parliament was at that time considered only as a trouble and burden; the imposition of such a burden on orders of men, who had been previously exempt from it, must have been on their part resisted and opposed. But from the words of the act of the 4th Edw. III. by which "It is *accorded*, that a parliament shall be holden every year once, and more often, if need be," it may be inferred, that it was rather regarded as a privilege of which they earnestly desired the frequent enjoyment, than as a burden from which they wished to be exempt. There were some boroughs, indeed, which, on account of their poverty, were unable to bear the expense of sending members to Parliament, and therefore declined the exercise of that privilege; but it were unfair to form any general conclusion from these particular instances. Besides, there are examples of boroughs petitioning to be restored to the use of the privilege of sending members to Parliament, after a very long interruption.

It appears incredible, that, if the whole legislative power had, before the reign of Henry III. been always placed in the hands of the nobility and the king, they should not have opposed the extension of it to so many persons of inferior rank; nor is it probable, that any new measure of such magnitude and importance, introduced by the Earl of Leicester, while acting at the head of the nobles and the people in a very dangerous contest against the crown, should have been confirmed and perpetuated by Edward I. But among the close rolls of the 24th of that king, there is a writ of summons to Parliament, in which it is asserted, not as an innovation introduced by the Earl of Leicester, "but as a maxim grounded on a most equitable law, established by the foresight and wisdom of sacred princes, that what concerns all, should be done with the approbation of all; and that dangers to the whole community should be obviated by remedies provided by the whole community," a species of language which could not, with propriety, have been used by Edward I. if the practice of summoning the commons to Parliament had been a measure of recent introduction. It is, moreover, observed, that there is not the slightest intimation, in any of the oldest writs for sending up representatives from cities or boroughs, that such elections were a novelty. Two claims are still extant, made in the reigns of Edward II. and III. which have been held forth as decisive of the antiquity of the custom of sending citizens and burgesses to Parliament, even from towns that were held under subjects, and not immediately of the crown. These are the claims of the towns of St Albans and Barnstaple. In the petition of the borough of St Albans, presented to Parliament in the reign of Edward II. the petitioners assert, that though they held *in capite* of the crown, and owed only for all other service their attendance in Parliament, yet the sheriff had omitted them in his writs; whereas, both in the reign of the king's father, and all his predecessors, they had always sent members. This expression, it is alleged, could not have been used, if the commencement of the House of Commons were to be dated only from the reign of Henry III. Reference is also made to a statute of the 5th year of Richard II. st. 2. which enacts, "that all and singular persons and commonalties, which from henceforth shall have the summons of the Parliament, shall come from henceforth to the Parliaments in the manner as they are bound to do, *and have been accustomed within the realm of England, of old times.* And if any person of the same realm, which from henceforth shall have the said summons (be he archbishop, bishop, abbot, prior, duke, earl, baron, banneret, *knight of the shire, citizen of city, burgess of borough,* or other singular person or commonalty,) do absent himself, &c. he shall be amerced and otherwise punished, *according as of old times hath been used to be done within the said realm in the said case.*" There is likewise a petition of the Commons in the second Parliament of Henry V. which sets forth, "that *as it hath ever been* their libertie and freedom, that there should no statute nor law be made, unless they passed thereto their assent, considering that the commune of your land, the which is and *ever hath been* a member of your Parliament, be as well assenters as petitioners," &c. This claim was not disallowed either by the lords or the king.

Such is the general train of reasoning by which the advocates of the antiquity of the House of Commons have endeavoured to support their cause. They maintain that the people, that is the citizens and burgesses, always formed a constituent part of the great council; that the statutes and records to which they refer, are to be considered as merely sanctioning and confirming an ancient privilege, and not as introducing any new measure of policy; and that although in some periods, and in certain instances, the people seem to have for a time discontinued the exercise of this privilege, yet that this discontinuance has been owing to particular circumstances, and ought not to have any effect upon the general argument.

Those, on the other hand, who deny this high antiquity of the commons, contend, and, we think, successfully, that in those periods to which their origin is referred, no such class of men as are denominated citizens and burgesses had any political existence. Although Tacitus affirms, that, among the ancient Germans, the consent of all the members of the community was required in every important deliberation; yet he speaks not of representatives; and this ancient practice, mentioned by the Roman historian, could only have place among small tribes, where every citizen might, without inconvenience, be assembled upon any extraordinary emergency. With regard to the Saxon Wittenagemote, it has not been determined with any degree of certainty by antiquaries, who were its constituent members. Besides the prelates and aldermen, or nobles, mention is also made of the *wites*, or wise men, as a component part of this national council; but who these wites were, it is not easy to ascertain from a review of the laws and history of that period. Some have supposed that they were the judges, or men learned in the law; others, that they were the representatives of boroughs, or what we now call the Commons. This latter supposition, however, appears to be contradicted by the expressions employed by all ancient historians, in mentioning the Wittenagemote. The members are almost always called the *principes, satrapæ, optimates, magnates, proceres*; which terms seem to apply only to an aristocracy, and to exclude the commons. Besides, the boroughs, from the low state of commerce, were, in those times, so small and so poor, and the inhabitants lived in such a state of dependence upon the feudal nobility, that it does not appear at all probable they would be admitted as a part of the national councils. We have already seen how slowly they emerged from this dependent state; and how gradually they acquired those privileges which entitle them to the rank of free men, and enabled them to exert an influence on the affairs of government. It may be remarked, too, that the commons are well known to have had no share in the governments established by the Franks, Burgundians, and other northern nations; and it is by no means probable, that the Saxons, who remained longer barbarous and uncivilized than those other tribes, could have ever thought of conferring such an honourable privilege on trade and industry. Indeed, in those rude ages, all who could boast the rank of free men were soldiers, and therefore the military profession was alone considered as honourable. The arts of industry were held in little repute, and were chiefly cultivated by persons in a servile condition. Even at the period of the conquest, as appears from Domesday-book, the greatest boroughs were scarcely more than country villages; and the inhabitants were of a station little better than servile. These boroughs were not then so much as incorporated; they formed no community; they were not regarded as a body politic; and being merely formed of a number of low, dependent mechanics, living in neighbourhood together, without any particular civil tie, they were incapable of being represented in the states of the kingdom. The first corporation, even in France, which made more early advances in arts and civilization than England, is sixty years posterior to the conquest; and in Normandy, the constitution of which was most likely to be William's model in raising his new fabric of English government, the states were entirely composed of the clergy and nobility; and the first incorporated boroughs, or communities, of that duchy, were Rouen and Falaise, which enjoyed their privileges by a grant of Philip Augustus, in the year 1207. The famous charter, as it is called, of the conqueror, to the city of London, although granted at a time when he assumed the appearance of gentleness and lenity, is nothing but a letter of protection, and a declaration that the citizens should not be treated as slaves.

It is remarkable, that all the English historians, when they mention the great council of the nation, call it an assembly of the baronage, nobility, or great men; and none of their expressions can, without the utmost violence, be tortured to a meaning, which will admit the commons to be constituent members of that body. If, in the long period of two hundred years, which elapsed between the conquest and the latter end of the reign of Henry III., and which abounded in factions, revolutions, and convulsions of all kinds, the House of Commons never performed one single legislative act, so considerable as to be once mentioned by any of the numerous historians of that age, they must have been totally insignificant; and what reason, then, can be assigned for their ever being assembled? Every page of the subsequent histories discovers their existence; yet these histories are not written with greater accuracy than the preceding ones, and indeed scarcely equal them in that particular. The *Magna Charta* of King John, enumerates the persons entitled to a seat in the great council, viz. the prelates and immediate tenants of the crown, without any mention of the commons: an authority, as Mr Hume observes, so full, certain, and explicit, that nothing but the zeal of party could ever have procured credit to any contrary hypothesis.

The statutes and records, upon which the arguments on the other side of the question are founded, are chiefly of dates posterior to the period, when the commons are admitted, upon all hands, to have formed a part of the parliaments; and besides, they advance merely general principles and maxims of government, without any reference to particular facts. With regard to the claims of St Albans and Barnstaple, Mr Madox has shewn, that no such tenure was known in England, as that of holding by attendance in parliament, instead of all other service; and that, moreover, the borough of St Albans never held of the crown at all, but was always demesne land of the abbot. It is no wonder, therefore, says Mr Hume, that a petition, which advances two falsehoods, should contain one historical mistake, which, indeed, amounts only to an inaccurate and exaggerated expression; no strange matter in ignorant burgesses of that age, who wanted to shake off the authority of their abbot, and to hold of the king, without rendering any services even to the crown.

The first notice which is given by historians of any representatives being sent to parliament by the boroughs, occurs during the reign of Henry III. in the year 1265;—at the period when the Earl of Leicester had usurped the royal authority, and summoned a new parliament to London, where he knew his power was uncontrollable. This assembly he fixed upon a more democratical basis, than any which had been called together, since the foundation of the monarchy. Besides the barons of his own party, and several ecclesiastics, who were not immediate tenants of the crown, he ordered returns to be made of two knights from each shire, and, what is more remarkable, of deputies from the boroughs; being the first time that this order of men appear to have been summoned to parliament. This period, accordingly, is commonly considered as the epoch of the House of Commons in England. The precedent, however, appears to have been regarded as the act of a violent usurpation, and to have been discontinued in subsequent parliaments, until the 23d year of Edward I., who, in consequence of his pecuniary embarrassments, occasioned by his foreign and domestic military expeditions, again had recourse to the measure of summoning the representatives of the boroughs to parliament; and this period seems to be the real and true epoch of the House of Commons, and the dawn of popular government.

At first, these representatives of boroughs did not, properly speaking, compose any essential part of the parliament: they sat apart both from the barons and knights, who appear to have regarded them as personages of a very inferior rank. Having given their consent to the taxes required of them, their business was considered as finished, and they separated, even although the parliament still continued to sit, and to canvass the national business. By this union, however, they gradually acquired more weight; and it became customary for them, in return for the supplies which they granted, to prefer petitions to the king for redress of any grievances of which they found reason to complain. The commons, however, do not yet appear to have assumed the character of legislators. Throughout the reign of Edward I., their assent is not once expressed in any of the enacting clauses, nor in the ensuing reigns, until ths 9th of Edw. III. nor in any of the enacting clauses of 16th Richard II. Nay, even so late as Henry VI., from the beginning till the 8th of his reign, the assent of the commons is not once expressed in any enacting clause. (See Ruffhead's edit. of the *Statutes*, preface, p. 7.) So little were they accustomed to transact public business, that they had no speaker till after the parliament 6th Edward III., and, in the opinion of most antiquaries, not till the first of Richard II. The burgesses did not even form the same house with the knights of shires. But as their wealth and consideration gradually increased, so did also their public importance; and, in the reign of Henry V., the commons required, that no laws should be framed merely upon their petitions, unless the statutes were worded by themselves, and had passed their house in the form of a bill. They were, at length, united in the same house with the knights of shires. This union, according to Mr Carte, who had carefully consulted the rolls of parliament, does not appear to have taken place until the 16th of Edward III. (See Carte's *Hist.* vol. ii. p. 451.) Even this union, however, was not uninterrupted; for instances afterwards occur of the knights and burgesses acting separately.

Thus did the commons, or third estate of the kingdom, gradually acquire their present form and importance. It were unnecessary for us, at present, to trace any farther the progress of an institution, which, besides the inestimable benefit of securing the liberties of the subject, has contributed so much to the efficacy and stability of the British constitutional government, as we shall have occasion to revert to this subject in the articles PARLIAMENT and WITTENAGEMOTE.

Boroughs are distinguished into those by charter or statute, and those by prescription or custom. The number of boroughs in England and Wales, including cities and cinque ports, which send members to parliament, is 215; some of which send one, others two representatives.

Burgesses were first admitted into the Scottish parliaments by Robert Bruce, in the year 1326; and in the preamble to the laws of Robert III. they are ranked among the constituent members of that assembly. By the articles of the union, the Scottish boroughs send fifteen representatives to the British parliament.

See Jacob's *Law Dict.* Heinrich's *Geschichte der Deutschen.* Hume's *Hist.* Lyttelton's *Hist.* Madox *Firma Burgi*, and *History of the Exchequer.* Brady's *Historical Treatise of Cities and Boroughs.* Petyt's *Right of the Commons.* Brady's *Answer to Petyt.* Tyrrel's *Appendix to his Hist. of England.* Robertson's *Hist. of Scotland.* (z)

BOROUGH, in the law of Scotland, signifies a corporate body, erected by charter of the sovereign, and consisting of the inhabitants of a certain district, with jurisdiction annexed to it. Boroughs hold either of the crown, or of a subject: hence they are distinguished into boroughs royal, and boroughs of regality or barony. All royal boroughs have power, by their charters, to chuse annually such office-bearers or magistrates as are specified in the grant; generally a provost, bailies, dean of guild, treasurer, and common council, who are elected in terms of the set or constitution of the borough.

The magistrates of royal boroughs have as extensive a civil jurisdiction within the borough, as the sheriff in his territory. They are also empowered by special statute, 1644, c. 35. revived by 1663, c. 6. to value and sell ruinous houses, when the proprietors refuse to rebuild or repair them. Their criminal jurisdiction, anciently pretty extensive, is now confined to petty riots. They never had jurisdiction in bloodwits, with the exception of a few boroughs, to whom that special right was granted by charter. The magistrates of some boroughs are, by their charters, constituted justices of the peace within the bounds of their erection; and, since the union, the eldest magistrate of every royal borough is named, of course, in all the commissions of the peace. In all matters of police, the magistrates and town council must concur, as the full representatives of the community. In this capacity they enact by-laws, chuse persons into offices which are in their gift, &c.; and they may not only proportion the public taxes among the inhabitants, but also impose taxations, for the utility of the borough, by their own authority, provided they have not only the consent of the magistrates and council, but of the special corporations burdened.

The *Convention of Royal Boroughs* is composed of deputies or commissioners, one from each borough, who were, as early as 1487, c. 3. authorised to meet yearly, to consider of the "welfare of merchandise, the gude rule and statutes for the common profite of burrows, and to provide for remeid upon the skaith and injuries sustained within the burrowes." Their powers were confirmed and enlarged by many subsequent acts; and accordingly that body have been in the practice of meeting annually in Edinburgh, for the purpose of regulating the matters committed to their charge.

In boroughs of barony and regality, the right of electing magistrates is, by the charter, vested sometimes in the inhabitants themselves, and sometimes in the baron or superior. Their jurisdiction extends to the cognisance of debts, and questions of possession between the inhabitants, and the superior's jurisdiction is always cumulative with that of the magistrates. See Erskine's *Inst. of the Law of Scotland*, b. i. tit. iv. § 20. Bell's *Dict. of the Law of Scotland.* (z)

BOROUGH-Courts, are certain courts of private and special jurisdiction, held in different cities, boroughs, and corporations, throughout the kingdom, by prescription, charter, or act of parliament. Of this species are the *Sheriff's Court*, and *Court of Hustings* in London. (*z*)

BOROUGH-English, so called in contradistinction, as it were, to the Norman customs, is a customary descent of some tenements held in ancient burgage, and copyhold manners, in consequence of which the youngest son, and not the eldest, succeeds on the death of his father; and if the proprietor leaves no issue, the estate descends to his younger brother. Various reasons have been assigned for this singular custom. Littelton (§ 211.) alleges it is because the youngest son, by reason of his tender age, is presumed to be more helpless than the rest of his brethren. Other authors have given a much stranger reason for this custom. It originated, they say, from the lords of certain lands having anciently the privilege of breaking the seventh commandment with their tenants' wives, on their wedding night; and therefore the tenement descended not to the eldest, but to the youngest son, who was more certainly the offspring of the tenant. The custom alluded to, however, never prevailed in England, although it appears to have obtained in Scotland, under the name of *mercheta*, or *marcheta*, until it was abolished by Malcolm III.

Blackstone, on the other hand, endeavours to trace the origin of this species of descent in a more rational way, by deducing it from the practice of the Tartars, and other pastoral tribes; among whom, according to Father Du Halde, this custom of descent to the youngest son also prevails. The reason assigned for it is this, that among nations composed totally of shepherds and herdsmen, the elder sons, as soon as they are capable of leading a pastoral life, migrate from their father with a certain allotment of cattle, and go to seek a new habitation; while the youngest son, who remains last at home with the father, is naturally the heir of his house, the rest being already provided for. This custom of the elder son's separating from the father, is also to be found among other northern nations; and the species of descent, called Borough-English, where it prevails, may be presumed to be a remnant of that pastoral state of society, which Cæsar and Tacitus describe as obtaining among our British and German ancestors. See Blackstone's *Comment*. b. ii. ch. 6. Jacob's *Law Dict*. (*z*)

BOROUGH-Head, or **Head-Borough**, called also, in some places, the *Borsholder*, or *Borough's ealder*, *Tithing-man*, &c. was a magistrate annually appointed to preside over a tithing, according to the institution of Alfred. He was one of the principal inhabitants, and presumed to be the discreetest man in the town or tithing. These head-boroughs are now a species of petty constables. See Constable, and Tithing. (*z*)

BOROUGH-Breach, or **Burgh-Breche**, (*Borgi fractura*,) signifies a breach of the peace by the inhabitants of a tithing, which was punishable by a fine imposed upon the community. *LL. Canut*, c. 55. (*z*)

BOROUGH-Bridge, a market town of England, in the west riding of Yorkshire, situated upon the river Eyre, over which there is a good stone bridge. In a field near the bridge there are three large stones of a huge size, and of the form of obelisks, standing upright in the ground. They are called the Devil's Arrows, and are supposed by some to be trophies raised by the Romans, while others imagine that they were placed there by the Britons. The highest stone is 22 feet, and 16 feet in circumference; the second is 21 feet high, and 17 feet round; and the third is 17 feet high, and 24 feet in circuit. There was formerly a fourth stone, but it was long ago demolished. Several Roman coins and antiquities have been found in the neighbourhood. The town carries on a considerable trade in hardware, which is the only manufacture it possesses. Number of houses 113. Population 680. See Gough's Camden's *Britannia*, and Pennant's *Tour from Alston Moor to Harrowgate*, 1804. (*j*)

Borromean Islands.

BORROMEAN Islands, the name of two islands called *Isola Bella* and *Isola Madre*, situated in the most western bay of the Lago Maggiore, and deriving their general name from the family of Borromeo, to whom they belonged.

The Borromean islands have been described with the greatest enthusiasm by Bishop Burnet and by Keysler as among the finest places in the world. Keysler says, "that these islands can be compared to nothing more properly, than to pyramids of sweetmeats, ornamented with green festoons and flowers." Keysler has given a very minute description of these islands, of which we shall avail ourselves in our account of the Lago Maggiore. At present we shall content ourselves with laying before our readers the brief description of them given by Mr Coxe, who does not seem to be such an enthusiastic admirer of these artificial islands. "As the taste of mankind alters with the succession of years, I considered it only as a monument of expence and folly. Terrace rises above terrace in regular gradations, bordered with flower-pots, or gigantic statues of horses, gods, and goddesses. The whole is raised upon arches, and the soil has been brought from the shore to cover them. The palace is magnificent, and contains a profusion of marbles and paintings. The lower part of the house overhangs the lake on one side, where several apartments are furnished in the style of grottos; the floors, pillars, and walls, are inlaid with various coloured stones, marbles, and shells; the view and the coolness united make this part a delicious summer retreat. If any thing justly gives this island the appellation of enchanted, it is the prospect from the terrace. The gradual diminution of the mountains, from the regions of eternal snow to the rich plain; the sinuosity of the lake; its varied banks; the bay of Marzozzo, bounded by vast hills; the neighbouring burgh of Palanza, and more distant view of Laveno; the numerous villages; the Isola Madre, on which is a palace of the Borromean family; and another island, sprinkled with fishermen's huts, form a delightful assemblage. These islands, and the whole western coast of the lake to the village of Locarno, was ceded to the King of Sardinia by the late Empress Queen at the treaty of Worms, in consideration of the assistance which she received from that monarch." See Coxe's *Travels in Switzerland*, vol. iii. lett. 91. p. 312. Burnet's *Letters in Switzerland*, 8vo. 1686, which is also published in Harris's *Collection of Voyages*, vol. ii.; and Keysler's *Travels*, vol. i. lett. 35. p. 374, &c. (*j*)

BORROMEO, Charles, a celebrated Cardinal of the Romish church, whose piety and zeal for reformation, entitle him to the remembrance of posterity. He was born at the castle of Arona, upon the Lago Maggiore, in October 1538, and was the son of Gilbert Borromeo, Count of Arona, and of Mary de Medicis. At the early age of twelve, he was appointed to an abbacy, which had been hereditary in the family; but he accepted of this office merely that he might apply the revenue which it yielded to charitable purposes; and he afterwards refused to hold any new benefice, unless he was permitted to apply the income which it afforded to some benevolent or public use. After acquiring a knowledge of languages at Milan, and studying the canon and civil law at Pavia, he took his doctor's degree in 1559. In the following year, his uncle Pius IV. succeeded to the pontificate, and the highest prospects of preferment were thus laid open to Borromeo. He was invested with the dignities of cardinal nephew, archbishop of Milan, legate of Ancona, Bologna, Romagna, and protector of several crowns, and religious orders. Elevated to such dignities at an early period of life, and necessarily surrounded with a brilliant train of attendants, we could scarcely have expected any of that humility and temperance with which Borromeo was distinguished. The first use which he made of the high influence he possessed, was to institute an academy, composed both of laymen and ecclesiastics, for the purpose of discussing literary topics, but particularly those which related to sacred subjects. This society met in the Vatican, and hence the transactions which they published were entitled *Noctes Vaticanæ*.

After the council of Trent had issued its decrees for the reformation of the clergy, Borromeo devoted himself, with the utmost ardour, to carry into effect these important resolutions. He dismissed at once 80 of his domestics; he abandoned the use of silk in his dress; and he began to reform the clergy, by increasing the means of their education. With this view, he founded a college at Pavia, and a Jesuit's college at Milan, and he took a principal part in erecting a splendid building for the university of Bologna.

Though strongly attached to the church of Rome, he was by no means blind to the vices and corruptions which were undermining its foundation, and he set himself to carry through a system of reform, perhaps too extensive for the power and influence of a single individual.

He revived the pastoral visits in Rome; he gave decency to public worship, by a number of salutary regulations; he cleared the cathedrals of those pompous busts and ornaments with which they were disfigured; and he began this unpopular work, by removing the monuments of his nearest relations.

This system was soon extended from the cathedrals to the other churches, to the fraternities of penitents, and even to the monasteries themselves, those fertile sources of every species of iniquity. In these salutary attempts he met with the most formidable opposition, which nothing but the most inflexible integrity could have surmounted. Even the civil power began to regard such changes with a jealous eye, and, contrary to its strongest interests, to retard, by remonstrances and complaints, the completion of Borromeo's plans. This opposition, however, was not so overpowering as that which he met with from several of the religious orders. Three provosts of the order of the Brothers of Humility, conspired against the life of the cardinal, and one of their confederates undertook the execution of their dark design. While Borromeo was performing his evening devotions in the archiepiscopal chapel of Milan, the assassin fired a harquebuss at him, but he fortunately missed his aim, and the life of the venerable cardinal was preserved.

The plague, which visited Milan in the year 1576, afforded a grand opportunity for the display of those great virtues which distinguished Borromeo. In procuring accommodation for the sick, in burying the dead, and in making regulations for keeping contagion from those that were healthy, the good cardinal exposed himself to every danger, and even sold his goods, in order to procure the means of relieving the distresses of his people.*

Worn out with these labours, and by that abstemious severity which he prescribed to himself, Borromeo was seized with an intermittent fever while at a place called the Sepulchre, on the mountain Varais. The violence of the disease permitted him, with difficulty, to travel to Milan, where he expired the day after his arrival, on the 4th of November 1584, in the 47th year of his age.

The sensations of true sorrow which were felt for the loss of this great man, extended beyond his own diocese to every corner of the province. He was immediately worshipped as a saint by the vulgar, though he was not regularly canonized till the year 1610.

At a little distance from the town of Arona, towards the Borromean islands, a colossal statue of brass has been erected in honour of Borromeo. It is placed on an eminence, very near a seminary for forty boys, founded by the cardinal. It is about 35 ells high,† and stands upon a pedestal about 25 ells in height. Borromeo is represented in the cardinal's habit, looking towards Milan: he has a book under his left arm, and his right hand is extended, as if he were in the attitude of blessing the city. This statue was cast at Milan, and was brought to Arona in separate pieces. Keysler, however, says, that it consists of one single piece.

The writings of Borromeo were very numerous, and were collected in 5 vols. folio, and printed at Milan in 1747. His *Acta Ecclesiæ Mediolanensis* was published in folio, in 1519. A life of Borromeo was published in the 17th century by Ribadeera, a Spanish Jesuit, which is filled with ridiculous fables respecting the miracles of the cardinal. Another life of him was published at Paris in 1761, in 3 vols. 12mo., by the Abbé Touron. See Keysler's *Travels*, vol. i. let. xxxv. p. 373; and Coxe's *Travels in Switzerland*, vol. iii. let. xci. p. 314. (*o*)

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* The exertions of Borromeo during the prevalence of the plague, form the subject of many of the finest pictures of Milan.

† Mr Coxe says, that the height of this statue is 60 feet.

BORROWDALE. See CUMBERLAND.

BORROWSTONESS, a town of Scotland, is situated on the south side of the Firth of Forth, about 18 miles north-west of Edinburgh, and 3½ north of Linlithgow, the county town. At what time the town of Borrowstoness began to be built is not exactly known, but it became a place of some consequence early in the seventeenth century; for in the year 1634 the population had increased so much, that an application was made to the parliament of Scotland to have the town erected into a separate parish from Kinneil, of which it had hitherto formed a part. And in the year 1669, the then Duke and Duchess of Hamilton applied for, and obtained an act of parliament, conjoining Kinneil to Borrowstoness; since which period they have continued one parish.

The town is a burgh of barony governed by a baron bailie, appointed by the Hamilton family; and although it is built in a very irregular manner, there are a number of good dwelling-houses, besides several very large and commodious warehouses for grain, &c. The two principal streets are narrow, and run from west to east about 350 yards, when they terminate in one, which is continued nearly 300 yards farther. The houses, from the smoke of the public works carried on in the town, bear all the marks of antiquity, and strangers are struck with the pandemonian appearance of the place. The smoke, however, is by no means so offensive as might be supposed, and, to those accustomed to it, seldom gives any concern,—at any rate it is not pernicious to the health of the inhabitants, there having been many instances of longevity; and at present there are several persons living above 80 years of age, and, in particular, one lady, said to be 94, who continues vigorous and in good spirits.

The town stands upon a point of land projecting into the sea, and nature seems to have pointed it out as an advantageous situation for a harbour. Previous to the existence of Borrowstoness, and for many years after it began to be formed, Blackness (a small village about 3 miles east of Borrowstoness,) was the place where the Glasgow merchants carried on the principal part of their trade with the east country; but Borrowstoness being nearer, and in every respect better adapted for the purpose, the shipping soon began to resort there. As a consequence of this, about the time of the union, in 1707, the customhouse appears to have been transferred from Blackness to Borrowstoness, where it still remains. Commerce continued to be carried on at Borrowstoness to a considerable extent, more particularly betwixt the years 1750 and 1780, during which period it was one of the most thriving towns on the east coast, and ranked as the *third* port in Scotland. But when the junction of the Forth and Clyde took place about 30 years ago, by means of the great canal, the trade began to resort to Grangemouth, (at that time called Lealeck,) where the canal terminates on the east; and the trade of Borrowstoness has since continued to decline. The merchants and others interested in the prosperity of Borrowstoness, soon foresaw the injury it would suffer by being deprived of the Glasgow trade, and with the view of obviating it, a subscription was opened in 1782, and an act of parliament obtained for making a branch from Borrowstoness to join the great canal at or near Grangemouth, which was actually begun and carried some length, but the funds failing, it was necessarily stopped, and still remains unfinished. The completion of this undertaking was the only probable means of preserving the trade at Borrowstoness, the harbour there being much more accessible to ships of size than Grangemouth, where the navigation is both very narrow and crooked; but it having unfortunately failed as above stated, Grangemouth has become the seat of commerce. All the customhouse business, however, being transacted at Borrowstoness, the town continued to derive some advantages from the resort of merchants and shipmasters, &c.; but of this advantage it has also been lately deprived, Grangemouth having been constituted a separate port, and a new customhouse opened there on the 1st Dec. 1810.

Borrowstoness.

From the causes which have been stated, and more recently from the pressure of the war, the trade of Borrowstoness has become small indeed, compared to what it once was.

The following Table exhibits the quantity of shipping employed in the foreign and coast trade, inwards and outwards for four years preceding the 5th January 1811, with the nature of the trade carried on.

Inwards.

Year ending.	Foreign Trade.		Coast Trade.		Nature of the Trade.
	Ships.	Tons.	Ships.	Tons.	
Jan. 5, 1806.	20	2615	151	7069	Timber, deals, iron, blubber, and fins. Flax, madder, and grain.
1809.	4	917	113	5904	
1810.	4	906	122	6019	
1811.	8	1399	130	6083	

Outwards.

Jan. 5, 1806.	8	1301	168	6625	Coals, salt, soap, soapers salt. Provisions, grain, and stone and earthen ware.
1809.	3	775	184	8472	
1810.	8	1332	207	8863	
1811.	6	1196	203	8367	

The above view of the trade shews how limited the foreign commerce has become, and that the imports have fallen off considerably ever since the year 1806.

The shipping of Borrowstoness has also much decreased since 1794. At that time there were seventeen brigs and eight sloops belonging to the town, but now they cannot be reckoned above half that number. The building of ships, however, is still carried on, although not so extensively as formerly. There is only now one master builder, whose mode of building is held in high estimation, and his vessels consequently meet with a ready market.

Several branches of manufacture and mechanical industry are carried on in Borrowstoness. Of these, the making of salt deserves first to be mentioned. This useful manufacture is carried on to a great extent here and in the neighbouring village of Grangepans. It is a lucrative concern to the proprietors, and produces a considerable revenue to the crown.

A pottery for manufacturing stone and earthen ware was begun in the year 1784, and is still continued upon a pretty extensive plan. This branch of business, however, is at present suffering, in common with others, under the pressure of the times. In the year 1803 an English gentleman, who has devoted his attention to chemical studies, settled in Borrowstoness, and carries on with considerable success, the making of *sal ammonaic.*

The manufacturing of *soap* is likewise a branch of industry in the place. There is also, in the immediate neighbourhood, a distillery newly erected, upon a pretty large scale, and at considerable expence.

And at present, two capacious lime kilns are building at the west end of the town, for supplying the farmers in the neighbourhood with lime for their land. The stones are brought by sea from Dunbar; and the coal for burning them is got, at a reasonable rate, from the Duke of Hamilton's coal works.

Many of the women in the town and country around, are employed in tambouring, and in the spinning of silk sent from London to agents here, who return the yarn to be manufactured into stockings.

Two of the Leith whale ships have fitted out here for some years past, and return with their blubber, which is manufactured into oil at a boiling house a little above the town.

As a natural consequence of the decay of trade, a number of families have from time to time left the place; and, at present, there are several good houses, besides some of an inferior sort, without inhabitants.

In these circumstances, it is not surprising that the population since the year 1794, should have diminished above 400.

At that time it was 2613
But at present (1811) it does not exceed 2200

From the facts which have been mentioned, it appears that this place is in a very declining state. It is indeed hardly possible to conceive that the foreign trade and shipping can be less than they are. It is more probable, were peace restored and a communication opened with the great canal, (as formerly unsuccessfully attempted), Borrowstoness, from its advantageous situation and excellent harbour, might still revive, and even surpass what it was at the time of its greatest prosperity. (I. B.)

BORYSTHENES. See DNIEPER.

BOSCAWEN'S ISLAND, or KOOTAHE, the name of an island in the South Pacific ocean, discovered by Schouten and Le Maire in 1616. It is about three miles in diameter, and is lofty and of a conical form. It is populous and productive, and is situated in W. Long. 173° 48′, S. Lat. 15° 55′. See Introduction to the *Missionary Voyage*, p. 67. (*j*)

BOSCIA, a genus of plants of the class Tetrandria, and order Trigynia. See BOTANY.—The same name has been given by La Marck to another genus of the class Dodecandria, and order Monogynia. (*w.*)

BOSCOVICH, ROGER JOSEPH, a celebrated mathematician and natural philosopher, was born at Ragusa, a city of Dalmatia, and capital of the little republic of the same name, on the 11th of May, 1711. His father, who was a respectable citizen of Ragusa, had no fewer than nine children, of whom Joseph was the youngest. At an early age he was sent to learn grammar and philosophy at the schools of the Jesuits in Ragusa. The temper and abilities which he displayed in the course of his education, pointed him out as a young man who might one day do honour to that able and enterprising association. Influenced, perhaps, by the example of his brother, who had entered the church, Boscovich applied for admission into the order of the Jesuits; and in the fifteenth year of his age, he went to Rome and took the habit of the noviciate. In this new situation, his attention was principally directed to the constitution of the order, to the study of rhetoric and belles lettres, but particularly to the composition of Latin poetry, in which he afterwards obtained such distinguished eminence. Having completed these preliminary studies, Boscovich was sent to the Jesuits college at Rome to study mathematics and philosophy. These new branches of knowledge gradually gained upon his affections, till he found himself completely absorbed in the study of the sciences. With a rapidity, unusual even in the history of genius, he made himself master of all the branches of elementary geometry; and when his preceptors were no longer able to assist him in his daring flight, he prosecuted without any help, the higher geometry, till he was enabled to read the *Principia* of Newton. In consequence of the reputation for mathematical knowledge which he thus acquired, he was employed to give private lessons in that science, and was exempted from the drudgery of teaching grammar and the classics, which all the noviciates of the order were obliged to undergo for five years before they were admitted to the study of theology. From the humble station of a private teacher, Boscovich was promoted to the professorship of mathematics at Rome, a situation for which he was eminently qualified, from his acquaintance with the works of the ancient geometers, as well as from the happy talent which he possessed for communicating his ideas to others. He was now led, by the nature of his duties, to compose elementary treatises on arithmetic, algebra, geometry, trigonometry, and conic sections, a task which he executed with an ability and success which men of genius seldom display in elementary compositions. His system of geometry contained the leading truths of that science in fourteen propositions; and his treatise on conic sections, which appeared in 1755, has been much admired for the simplicity and elegance of its demonstrations.

In the public disputations, the genius of Boscovich was principally called into action. His love of glory was highly inflamed by every accession to his fame; and he omitted no opportunity to gratify this favourite propensity, in the only way in which it ought to be gratified, by a zealous prosecution of philosophical discovery, and by an unremitting assiduity in promoting the happiness of his fellow creatures.

Under the influence of such excitements, Boscovich directed his attention to almost every branch of physical science. A new theory of the solar spots; the transit of Mercury over the sun; the figure of the earth; the annual aberration of the fixed stars; the inequalities in terrestrial gravity; the limits of certainty in astronomical observations; the solid of greatest attraction; the comets; the flux and reflux of the sea; and the atmosphere of the moon, were among the subjects of astronomy which he investigated. In pure mathematics, he wrote upon osculating circles; on infinitesimals; on the cycloid; on logistic curve lines; and on the calculation of fractions. His optical dissertations were, on a new telescope for celestial objects; on light; on the rainbow; on lenses and dioptrical telescopes, and on the object glass micrometer. Besides these various papers, he wrote on the aurora borealis, on the motion of bodies in unresisting media, on the *vires vivæ*, on the centre of gravity, on the law of continuity, and on the divisibility of matter. In the course of these various investigations, the attention of Boscovich was necessarily drawn to the constitution of matter; and he appears, even at this early part of his life, to have formed an outline of that Theory of Natural Philosophy which has been so universally admired, and on which his reputation as a philosopher principally depends.

Nor was the attention of Boscovich confined to the physical and mathematical sciences. He had a wonderful facility in the composition of Latin verses; and such was his love for this species of amusement, that every incident, however trifling, called forth an offering to the muses. With such talents and acquirements, the company of Boscovich was assiduously courted at Rome; and at every party to which he was invited, he shone, by the liveliness and fluency of his conversation. With a pardonable vanity, which is not usual with men of profound genius, he often led the conversation of the company to the subject of his own studies, which he had a singular faculty of explaining to the most common capacities; and he seemed to derive particular pleasure from the recitation of long passages of his own poetry. This happy talent of amusing a company with subjects of science, though it may have been possessed by other philosophers, was certainly exhibited for the first time in the manners of Boscovich. The habits of abstract thought and close reasoning, which a natural philosopher must necessarily acquire, are utterly incompatible with that quickness of association and versatility of thought, which are the principal sources of extemporaneous declamation. These antisocial habits, however, are less hostile to his colloquial efforts, than the nature of the subjects with which the mind of the natural philosopher is principally conversant. While the study of history, poetry, and the belles lettres, furnish numerous and interesting topics of general conversation, the man of science is prevented from introducing subjects which would be generally unintelligible, and is thus denied the opportunity of displaying his knowledge and his talents, which is granted to those who cultivate literature and the fine arts. In what manner Boscovich overcame these difficulties, it is not easy to discover; but he must have possessed no ordinary confidence in his talents, and no ordinary influence over the minds of others, who could fix the attention of a mixed company upon the abstract speculations of science and philosophy.

The fame which Boscovich now enjoyed was not confined within the limits of his native country. He was admitted, without solicitation, into most of the learned societies of Europe, and, without enjoying any of the substantial patronage of kings, he was honoured with their invitations and their praise. Pope Benedict XIV. consulted him on several subjects of civil engineering, and appointed him a member of a committee consisting of architects and mathematicians, who were assembled from different parts of Italy, to examine the cupola of St Peter's, in which a rent had been perceived. The architects and the mathematicians differed in their sentiments; but the latter, with Boscovich and the Marquis Poleni at their head, finally prevailed. Boscovich proposed to strengthen the cupola by enclosing it in a circle of iron; and this opinion being adopted, the Marquis reported it to the Pope, but unfortunately neglected to give Boscovich the merit of the suggestion. This omission grievously offended the vanity of the mathematician, and conspired, along with other causes of mortification, to make him resolve on quitting Rome. About this time, John V. of Portugal had determined to survey Brazil, and to fix the boundaries between that country and the territories belonging to Spain. He applied to the general of the Jesuits for ten mathematicians to execute this plan; and no sooner did Boscovich hear of the project, than he offered to superintend the undertaking, and to measure, at the same time, a degree of the meridian. The enlightened minister of Benedict XIV., unwilling that Italy should lose one of her greatest ornaments, appointed Boscovich to correct the maps of the papal territories, and to measure a degree of the meridian in Italy. Provided with excellent instruments, and assisted by Christopher Maire, an English Jesuit, Boscovich began the undertaking about the end of the year 1750; and after two years labour, he extended the meridian from Rome to Rimini, across the Apennine chain, and found that the length of a degree in the latitude of 43° was 56,979 toises. During the intervals of this active employment, he was engaged in completing his *Elements of Conic Sections*; and when travelling over the mountains, he is said to have composed, on horse-back, his fine Latin poem, entitled, *De Solis ac Lunæ Defectibus*, "on the Eclipses of the Sun and Moon." An account of this survey was publised by Boscovich at Rome and Paris, along with some excellent dissertations on several subjects connected with his undertaking. At the completion of a service so full of labour and anxiety, Boscovich was entitled to expect some adequate remuneration, or some office that would have freed him from the drudgery of teaching. The Pope, however, who seems to have undervalued the national work which he had just completed, presented him with a gold box, and the paltry sum of 100 sequins.* In consequence of this blind parsimony, Boscovich was compelled to resume the labours of his mathematical professorship.

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* About forty-five pounds sterling.

A dispute respecting the draining of a lake, which, about this time, originated between the Tuscan government and the republic of Lucca, afforded a new opportunity for the exercise of Boscovich's talents. A number of mathematicians and commissioners had been appointed to decide the controversy; but the commissioners having failed to appear, he repaired to Vienna to obtain the decision of Francis I. whose influence was paramount in Italy. At the Austrian capital he employed his poetical talents in celebrating the successes of Francis over Frederick the Great; but his attention was chiefly directed to his new theory of natural philosophy, which he is said to have drawn up in the short space of thirty days, and which he published at Vienna in 1758, under the title of *Theoria Philosophiæ Naturalis redacta ad unicam legem virium in natura existentium*, a work of distinguished merit, which we shall have occasion to consider at great length in the subsequent article.

Having succeeded in settling the dispute in favour of the republic of Lucca, he was handsomely rewarded by the senate with a present of 1000 sequins.[*]

The talents of Boscovich as a negociator, pointed him out to the Senate of Ragusa, as the fittest person for settling a misunderstanding that existed between that republic and the British government. It was alleged by the latter, that the Ragusans had infringed their neutrality by fitting out vessels for the French service; and as there had been no just ground for this suspicion, so injurious to the commerce of his native city, Boscovich repaired to London, and succeeded in establishing the integrity of the republic of Ragusa.

On his way to London, Boscovich visited Paris, where he remained for six months, enjoying the exquisite society which then distinguished the French metropolis. During his stay at London, he was chosen a Fellow of the Royal Society in 1760; and he published his work, *De Solis ac Lunæ Defectibus*, which he dedicated to that learned body.

The approaching transit of Venus in 1761, had at this time absorbed the attention of philosophers, and numerous parties of astronomical observers were sent to different parts of the world. Boscovich was invited by the Royal Society to accompany the party of its members that was going to America; but as such an expedition would have greatly retarded his return to Italy, and interfered with some other plans, he was obliged to decline the invitation, and return to his native country. At Venice he met with his friend Corner, who accompanied him to the Plain of Troy, which they visited on their way to Constantinople. During his residence in Constantinople, his happiness was completely embittered by a continuance of ill health, which rose to such a height that it frequently threatened his existence. After he had begun to recover his strength, he left Constantinople in the train of the English ambassador, Sir James Porter, and travelled through Bulgaria, Moldavia, and part of Poland, with the intention of visiting the capital of Russia; but the death of Peter deterred him from the prosecution of his travels. An account of this journey was afterwards published in French and Italian, but it did not add much to the fame of its author.

The return of Boscovich to Rome was eagerly welcomed by his countrymen, and his talents were speedily called into exercise for the public good. In the spring of 1764, the Austrian governor of Milan appointed him to the mathematical chair in the university of Pavia, where the mean jealousy of his colleagues forced him to defend his reputation by the publication of his *Dissertationes Dioptricæ*, which related principally to the correction of the aberration of refrangibility in achromatic telescopes. The fame which he derived from this ingenious work, silenced, for a while, the calumnies of his rivals; but their malice having again broken out with increasing violence, Boscovich sought for tranquillity in a journey to France and the Netherlands. When he returned from this excursion, he was transferred from the college of Pavia to the Palatine schools at Milan, where he received from the Empress queen the professorship of astronomy and optics, and was also appointed to superintend the observatory of the Royal College of Brera, which was furnished with instruments chiefly at his own expense.

When Boscovich had repaired to the baths of Albano to strengthen his constitution, he received the mortifying intelligence, that several of the young Jesuits whom he had employed as assistants, had conspired against his favourite pupil, and had prevented the government from appointing him to some office of trust. He complained, in vain, to Prince Kaunitz and to the governor of Milan, of this insulting conduct; but having received no redress, he retired to Venice, where he continued for ten months, and at last formed the resolution of spending the remainder of his days at Ragusa. When he was upon the eve of carrying this resolution into effect, his plans were completely frustrated by the suppression of the order of Jesuits in 1773.

In consequence of this sudden revolution, so hostile to his temporal interests, he went to Paris along with La Bord, the chamberlain of Louis XV., and sought in a foreign country those honourable rewards of genius which had been so unjustly denied him in his own. The influence of his friend La Bord procured for him the patronage of the French king, who appointed him Director of Optics for the Marine, a new office created on purpose, with two pensions, amounting to 8000 livres.[†] Such rapid promotion given to a foreigner, naturally excited the jealousy of the French philosophers. The piety of Boscovich, the freedom of his conversation, and his personal vanity, were by no means calculated for the meridian of Paris. The generosity of the sovereign was not seconded by the kindness of his subjects; and Boscovich, after all his services to science, was doomed to experience a neglect, which was the more mortifying, when he reflected on the idolatry with which he was formerly regarded at Rome. To a man of keen temper, like Boscovich, who knew his own merits, this cold treatment was unsufferable. He therefore requested leave of absence from his royal patron, and retired, in 1783, to Bassano, in the state of Venice, where he employed himself in preparing for the press a collection of his unpublished works, which he completed in 5 vols. 4to, entitled, Rogerii Josephi Boscovich, *Opera pertinentia ad Opticam et Astronomiam maxima ex parte Nova, et omnia hucusque inedita, in quinque tomos distributa.* Bassani, 1785.

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[*] About four hundred and fifty pounds sterling.

[†] About three hundred and thirty-three pounds sterling.

Many of these dissertations are extremely valuable; and the mathematical investigations which they contain, are distinguished by a clearness and elementary simplicity, which is very unusual in similar writings. When this labour was at an end, he spent some months in the convent of Valombrosa, in Tuscany, and afterwards went to Rome to revisit the companions of his early years. From Rome he went to Milan, where he resumed his own studies, and amused himself with completing a new edition of his friend Benedict Stay's beautiful poem, entitled, *Philosophia Recentior,* enriched with notes, and extended to ten books. The proposals, however, which he issued about this publication, did not obtain him many subscribers; and the limited circulation which his works experienced, excited a dejection of spirits which his constitution was not able to bear. His leave of absence from Paris was now nearly expired, and he felt the greatest reluctance to return among the jealousies which surrounded him in the French capital. The conflict between his gratitude to the French king, and his own personal feelings, increased the melancholy which preyed upon his spirits, while a violent attack of the gout, and an inflammation in the lungs, completed his sufferings, and drove him into a state of derangement.

Though this dreadful disorder proceeded, in some measure, from the bodily infirmities of Boscovich, yet it was chiefly owing to that secret anguish which sprung from the ingratitude of his countrymen, and the injustice of his cotemporaries. The visions of youthful ambition which the sanguine hopes of Boscovich had so early cherished; the reverence which was paid to him at Rome, at Paris, and at London; the great success of his writings; the high employments which he was afterwards called to fill, and the favour which was shewn to him by several of the princes of Europe,—the recollection of these better days, contributed to awaken more acute sensations at the neglect into which, in his old age, he had been permitted to fall. He felt that all his philosophy was insufficient to quiet the ferment of a proud spirit, and he sought in religion for that support which it alone could bestow. Under the influence of these pious feelings, he regretted that he had spent so little time in the sacred duties of his profession, and that so much of his leisure had been occupied, by what he now considered, as the idle speculations of philosophy. We are unwilling to believe, with one of the biographers of Boscovich, that these religious impressions were the consequences of his mental delirium. At no period of his life, did Boscovich ever hazard an opinion hostile to the noble sentiments which supported him in his latter days; and the reverses and disappointments which embittered the close of his life, naturally carried his views beyond this troubled state of existence, which a proud and mortified spirit is so willing to resign. Under the influence of these feelings, an imposthume burst in his breast, and he died on the 13th of February, 1787, in the 76th year of his age. He was interred without any kind of pomp, in the parish church of St Maria Pedore; and the Senate of his native city erected a monument to his memory, with the following inscription, composed by his friend Benedict Stay:

ROGERIO. NICOLAI. F. BOSCOVICHIO,
Summi. Ingenii. Viro. Philosopho. Et. Mathematico. Præstantissimo
Scriptori. Operum. Egregiorum
Res. Physicas. Geometricas. Astronomicas
Plurimis. Inventis. Suis. Auctas. Continentium
Celebriorum. Europæ. Academiarum, Socio
Qui. In. Soc. Jesu. Cum. Esset. Ac. Romæ. Mathesim. Profiteretur
Benedicto XIV. Mandante
Multo. Labore. Singulari. Industria
Dimensus. Est. Gradum. Terrestris. Circuli
Boream. Versus. Per. Pontificiam. Ditionem. Transeuntis
Ejusdemque. Ditionis. in Nova. Tabula. Situs. Omnes. Descripsit.
Stabilitati. Vaticano. Tholo. Reddundæ
Portubus. Superi. Et. Inferi. Maris. Ad. Justam. Altitudinem. Redigendis
Restagnantibus. Per Campos. Aquis. Emittendis. Commonstravit. Viam
Legatus. A. Lucensibus. Ad. Franciscum. I. Cæsarem. M. Etruriæ. Ducem
Ut. Amnes. Ab. Eorum. Agro. Averterentur. Obtinuit
Merito. Ab. Iis. Inter. Patricios. Cooptatus
Mediolanum. Ad. Docendum Mathematicas. Disciplinas. Evocatus
Braidensem. Extruxit. Instruxitque. Servandis. Astris. Speculam
Deletæ. Tum. Societati. Suæ. Superstes
Lutetiæ Parisiorum. Inter. Galliæ. Indigenas Relatus
Commissum. Sibi. Perficiundæ. In. Usus. Maritimos.
Opticæ. Munus. Adcuravit
Ampla. A. Ludovico. XV. Rege. Xmo. Attributa. Pensione
Inter. Hæc. Et. Poesim. Mira. Ubertate. Et. Facilitate. Excoluit

Doctas. Non. Semel. Suscepit. Per. Europam, Peregrinationes
Multorum Amicitias. Gratia. Virorum. Principum. Ubique. Floruit
Ubique. Animum. Christianarum. Virtutum
Veræque. Religionis. Studiosum. Præ-se-tulit
Ex. Gallia. Italiam. Revisens. Jam. Senex
Cum. Ibi. In. Elaborandis. Edendisque. Postremis Operibus
Plurimum. Contendisset. Et. Novis. Inchoandis. Ac. Veteribus. Absolvendis
Sese Adcingeret
In. Diuturnum. Incidit. Morbum. Eoque. Obiit. Mediolani
Id. Feb. An. MDCCLXXXVII. Natos. Annos LXXV. Menses IX. Dies. II.
Huic. Optime. Merito. De Republica. Civi
Quod. Fidem. Atque. Operam. Suam. Eidem. Sæpe. Probaverit
In Arduis. Apud. Exteras. Nationes
Bene. Utiliterque. Expediundis. Negotiis
Quodque. Sui. Nominis. Celebritate. Novum. Patriæ. Decus. Adtulerit.
Post. Funebrem. Honorem. In. Hoc. Templo. Cum. Sacro. Et Laudatione
Publice. Delatum
Ejusdem. Templi. Curatores
Ex. Senatus. Consulto
M. P. P.

Boscovich was considerably above the middle size, of a strong make, and with a long and sallow visage. He possessed the virtues and the failings which spring from a warm temper; and while the former endeared him to his friends, the latter proved injurious only to himself. His numerous writings are evidently the production of an original and inventive genius, and though composed in a diffuse style, and with a redundancy of illustration, are distinguished by a simplicity and perspicuity which are seldom found in physical investigations.

The works of Boscovich which he published at Bassano, contain the following Opuscules:

Vol. i. Opusc. 1. De constructione et usu novi instrumenti maxime idonei ad determinandas vires refractivas, et distractivas substantiarum diaphanarum. Opusc. 2. Deductio formularum pertinentium ad focos lentium, cum earum applicatione ad calculandas sphæricitates, quæ adhibendi debent pro telescopiis acromaticis.

Vol. ii. Opusc. 1. De correctionibus pertinentibus ad oculares, quibus accedit correctio solius erroris figuræ sphæricæ objectivorum. Opusc. 2. De Lente ustoria potissimum ingenti. Opusc. 3. De modo determinandi discrimen velocitatis, quam habet lumen, dum percurrit diversa media, per dua telescopia dioptrica, alterum commune, alterum novi cujusdam generis. Opusc. 4. De novo genere micrometri objectivi. Opusc. 5. De telescopis exhibenti simul binas imagines ejusdem objecti, alteram directam, alteram inversam, cum earum motibus contrariis et æqualibus. Opusc. 6. De globulis nigris translatis per discum solis, cum Epistola Gallica ad ejus phenomeni observatorem. Opusc. 7. De refractionibus astronomicis. Opusc. 8. De refractionibus astronomicis, et altitudine poli, determinandis per distantias apparentes binarum fixarum supra et infra polum. Opusc. 9. Methodus determinandi refractiones astronomicas sine ulla suppositione physica, quæ non videantur omnino certa, ope instrumenti habentis utilitatem generalem in tota astronomia.

Vol. iii. Opusc. 1. De la determination de l'orbite d'une comete par trois observations pas eloignées entr'elles. Opusc. 2. Sus la nouvelle planete.

Vol. iv. Opusc. 1. De verificatione divisionum quadrantis muralis. De verificatioue machinæ parallacticæ. Des formules differentielles de trigonometrie. De rhombo micrometrico.

Vol. v. Opusc. 1. De apparitione et disparitione annuli Saturni. Opusc. 2. Sur les èlements de la rotation du soleil sur son axe determines par observations de ses taches. Opusc. 3. De determinatione longitudinis penduli oscillantis ad singula secunda temporis medii. Opusc. 4. Notice abregée de l'astronomie pour un marin. Opusc 13. De calculando aberratione astrorum orta e propagatione luminis successiva, &c. and several other opuscules on the orbits of the comets and planets.

The principal works published by Boscovich in a separate form, were,

De Maculis Solaribus exercitatio Astronomica, habitum Collegio Romano Soc. Jesu. Rom. 1736. 4to.

De Mercurii novissima infra solem transitu, dissertatio habita in Collegio Romano. Rom. 1737. 4to.

De Inequalitate gravitatis in diversis terræ locis, dissert. habita in Sem. Roman. Rom. 1741. 4to.

De Annuis fixarum Aberrationibus. De Observationibus Astronomicis, et quo pertingat earumdem certitudo. Disquisitio in universam astronomiam. Rom. 1742. 4to.

De Motu Corporis attracti in centrum immobile, in spatiis non resistentibus. Rom. 1743. 4to. This is published in the Comment. Bonon. 1747. tom. ii. p. 111.

Nova Methodus adhibendi phasium observationes in eclipsibus lunaribus. Rom. 1744. 4to. This is also published in the Memorie sopra la fisica &c. in Lucca per li Salani, 1747. 8vo.

De Cometis. Rom. 1746. 4to.

De Æstu Maris. Rom. 1746.

Dissertatio de Lumine. Rom. 1749. 4to.

Osservazioni dell' ultimo passagio di Mercurio sotto il soli, reguito a' 6 di Maggio 1753. Rom. 1753.

De Lentibus et telescopiis dioptricis. Rom. 1755. 4to.

De Inequalitatibus quas Saturnus et Jupiter sibi mutuo videntur inducere. Rom. 1756. This paper was drawn up for the prize given by the Academy of Sciences; but the Memoir of Euler was successful.

Boscovich.

Philosophiæ Naturalis theoria redacta ad unicam legem virium in natura existentium. Viennæ, 1758. 4to. The second edition of this work appeared at Venice in 1762, and the third at Vienna in 1764.

De Solis ac Lunæ defectibus libri quinque. London, 1760, 4to. This work was reprinted at Venice in 1761 in 8vo.; and a French translation of it by the Abbé Barruel, appeared at Paris in 1779.

Voyage Astronomique et Geographique pour mesurer deux degrés du meridien par les PP. Maire et Boscovich, traduit du Latin, par le P. Hugon, et augmenté par le P. Boscovich lui-meme.

Memorie sulli cannochiali diottrici. Milan, 1771.

Beside these works, Boscovich wrote several treatises on practical hydraulics, connected with the subject of rivers, harbours, and lakes. See *Elogio del Boscovich per il* Sr. Baiamonti.—Ragusa, 1789, 8vo. *Journal des Sçavans*, Feb. 1792, p. 113. *Journal de Paris*, 13th Mars. 1787. (β)

BOSCOVICH'S THEORY.

Boscovich's theory of Natural Philosophy.

THE theory of natural philosophy which claims Boscovich for its author, has attracted, in no small degree, the attention of the learned: And although we are by no means disposed to imagine, that much progress is likely to be made in physical science by the original excogitation, or by the general application of theories of any kind, and are rather inclined to fall in with the opinion of the celebrated Bacon, that mankind are much more liable to be seduced into the winding mazes of error and fancy, than directed in the more difficult path of truth and knowledge, by that fondness for systems, and those habits of generalization, to which they are so much addicted; yet this theory has appeared so specious, so general in its application, and so well adapted to the explanation of most of the difficulties that occur in physical science, that we have thought it would be proper to give our readers such an account of it, at least, as, if not sufficient to render them masters of the ingenious conceptions of its author, may perhaps induce them to search for farther information, in the works of the illustrious Ragusan.

This theory is alleged, by Boscovich, to hold the mean between those of Leibnitz and of Newton; since it admits, with the former, that the elementary particles of matter are simple and unextended; and with the latter, that they act on each other by mutual forces, which are variable at different distances.

We may add too, that, with Leibnitz and his followers, Boscovich argues strenuously for the existence of the general *law of continuity*. While, with the followers of Newton, he admits, in general, the *actio e distanti*; and also agrees with them in their ideas respecting light, gravity, the pressure of fluids, &c.

But from the Leibnitzian this theory differs widely, in not admitting that continued extension can arise from contiguous and inextended atoms; a difficulty long ago urged against the system of Zeno: and also, in alleging, that the ultimate particles of matter are homogeneous, in opposition to the principles of *indiscernibles*, and the *sufficient reason* urged against that doctrine by the disciples of Leibnitz.

From Newton also he conceives himself to differ, in explaining by one law of forces, not only all those phenomena (and many more) for which the former author, in his last optical query, seems to think three principles were requisite, viz. gravitation, cohesion, and fermentation; but also in alleging, that, at the least distances, the mutual forces are not attractive, but repulsive; and that this repulsive force, with the diminution of distance, increases *in infinitum*. Of course, it necessarily follows, that cohesion does not arise from absolute contact of parts; and that, in fact, absolute mathematical contact, as it is called, cannot possibly exist.

The theory expounded.

Let us now proceed to unfold the theory. The first elements of matter, according to Boscovich, are, *points* altogether inextended and indivisible, disseminated in an immense vacuum, and placed at certain distances asunder. These distances may be increased or diminished, but cannot altogether vanish, without an absolute compenetration of particles; for their possible contiguity he altogether denies. These particles he conceives endued with inertia; persevering, if single, in their state of rest, or uniform rectilineal motion.

He conceives two of these *points* of matter to have a determination, at some distances, to approach each other; at others, to recede: and this he calls, the force attractive or repulsive, the magnitude of which changes with the distances, according to some law which may be expressed by an algebraical formula, or, as is common in mechanics, by a curve line. This law of the forces is such, that, in the smallest distances, it is repulsive, increasing indefinitely as the distance is diminished; and is therefore equal to the extinction of any force of approach, however great. At a distance somewhat greater, this force diminishes, so that a very little way off, it vanishes entirely: beyond that, the force becomes attractive, which, as we continue to pass outward, arrives at its maximum, then diminishes and vanishes; after that, a repulsive force takes place again, which, in its turn, increases to a maximum, then diminishes and vanishes; and thus, passing through several alternations until we arrive, at length, at a force constantly attractive, but diminishing inversely as the square of the distance, which continues at least as far as the limits of our planetary system, and is no other than the general law of Newtonian gravity.

By help of a curve.

PLATE LXV. Fig. 1.

The apparent complication of this, will be best removed, and a general idea of the whole system most readily obtained, by referring to Figure 1. Plate LXV. where the axis CAC′ has, in the point A, a perpendicular drawn to it; on either side of which, there are two equal and similar branches of a curve. One of these, DEFGHIKLMNOPQRSTV, has, in the first place, the asymptotic arc ED. That is, if it were produced towards the parts BD, beyond

Plate LXV. Fig. 1.

any whatever limits, though it will constantly approach nearer to the line AB, and come at length within less than any assignable distance from it, yet it will never meet it. On the other hand, the curve in the direction DE, constantly recedes from the same right line, (nay, even all the other arcs towards V, successively recede from it), and first approaching the axis CC′, meets it somewhere in E, cuts it, and departs off to a certain distance F; from whence it begins again to approach the axis, and cuts it again in G; and thus winds across the axis CC′ for several times, until, at length, it ends in another asymptotic branch T *p s* V, which approaches the axis so that the distances from it are apparently in the duplicate ratios of the corresponding distances from the centre A.

It is hardly necessary to inform the scientific reader, that if from any points of the axis, as *a*, *b*, *d*, there be drawn perpendiculars *a g*, *b r*, *d h*; any segment of the axis, as A *a*, A *b*, A *d*, is called an abscissa, and refers to the distance between the two points of matter; while the perpendicular *a g*, or *b r*, or *d h*, is called the ordinate, and exhibits the mutual force, repulsive or attractive, according as it lies on the side of the axis towards D, or on the opposite side.

Now, it is plain that in this form of the curve, the ordinate *a g* increases beyond any limits whatever, if the abscissa A *a* is diminished equally beyond any given limits; that if this abscissa be increased as in A *b*, the ordinate is diminished as in *b r*; and so continually, until it arrives at E, where the ordinate vanishes. Then the abscissa being increased to A *d*, the ordinate changes its direction into *d h*; and on the opposite side will increase, first towards F, and then decrease by *i l* as far as G, where it vanishes; and again will change its direction into the former, as at *m n*, and so, after several changes, the ordinates come to have a constant direction, as in *o p*, *v s*, sensibly decreasing in the inverse ratio of the squares of the abscissas A *o*, A *v*. Wherefore it is manifest, that, by a curve of this kind, these forces may be expressed; first repulsive, and in the smallest distances increasing indefinitely as the distances are diminished; lessening as these are increased; then vanishing; then, with a change of direction, passing off into attractive forces, which also, in their turn, vanish; and at length, after several changes, they become, in distances sufficiently great, attractive in the inverse duplicate ratio of the distance.

Different from that which expresses gravity.

This curve, which Boscovich has exhibited in a variety of his dissertations, differs considerably from that expressing the Newtonian law of gravity. The latter, which is a hyperbola of the third degree, lies entirely on one side of the axis, and has two asymptotic branches; the one of which, forming a part also of Boscovich's curve, expresses the indefinite diminution of the force of gravity, while the distances are increased; the other, the indefinite enlargement of that force, when the bodies are sufficiently near.

According to Boscovich, however, this indefinite enlargement of the force of gravity, is not only contrary to experiment, but even impossible. He occupies a considerable part of the *Dissertatio de Legibus Virium in Natura existentium* in showing that there cannot be attractive forces in the least distances, increasing infinitely. For, in the first place, if these forces act in small distances, they must augment the velocity of approach until absolute contact. At which instant this augmentation, where it has arrived at a maximum state, will be at once destroyed.

Secondly, should these forces thus acting in minute distances, increase in any inverse ratio of the distance, the velocity increasing constantly until contact must be infinitely greater there than at any given distance; a supposition which Boscovich considers as absurd, since an infinite velocity implies a finite space passed over in an instant or point of time. For these, and many other reasons unnecessary for us to repeat, Boscovich has rejected the possibility of any attractive force acting in the most minute distances, let the law of action be what it may. But the whole of these difficulties cease at once, were we to suppose that a repulsive force, equal to the extinction of any given velocity, should act in the like situations, since that force must hinder entirely any mutual access or concourse.

Disco of the theory

But it will in all probability be better for us to follow our author, in the account he has given of the way in which the essential parts of this theory were originally suggested to him.

Percu

In writing a dissertation *De viribus vivis*, or concerning living forces, as they are called by the followers of Leibnitz, and in which he derived all those things commonly referred to the *vires vivas*, from the sole velocity generated by the powers of gravity, elasticity, &c., he began to enquire more carefully into the velocity produced by impulsion; where, since the velocity is supposed to be acquired in a moment of time, the force is said to be infinitely greater than any pressure. And it occurred to him, that the laws of percussions of that kind must be very different from the other. But, upon more mature reflection, it appeared, that this notion was inadmissible, since nature every where employed the same mode of action; and that immediate impulse or percussion could not exist without the production of a finite velocity in an indivisible moment of time, without a certain *saltus* and breach of what is called the law of continuity, a law which he conceived really to exist in nature, and to be sufficiently demonstrable.

For instance, let two equal bodies be conceived moving in the same direction; A, which precedes, with the velocity 6, and B following with the velocity 12. After collision, it is well known they both proceed with the velocity 9. Now, if each of the bodies retains its velocity until the very moment of collision, it must follow, that at that very instant, the one diminishes its velocity, while the other increases, and each of them abruptly, *per saltum*, viz. A passing from 6 to 9, and B from 12 to 9, without any transit through the intermediate degrees, 7 and 11, 8 and 10, 9½ and 8½, &c. For it would be absurd to say, that during the contact any change through the intermediate degrees can take place; for the anterior parts of B, which is, by hypothesis, moving faster, must, in the small portion of time which elapses between the beginning of the contact and the acquisition of the common velocity, have penetrated the posterior part of A, contrary to the acknowledged properties of matter. The change must, therefore, be abrupt; and, consequently, involve a breach of the law of continuity, according to which it is altogether impossible to pass from one degree of magnitude to another, without also passing through all the intermediate degrees.

There are many who get rid of this difficulty, by denying altogether the existence of bodies perfectly hard, or incapable of compression, and by alleging that the change of velocity takes place during the introcession or compression of the parts of the bodies, without any breach of the law of continuity.

But this argument is of no avail to those who, with Newton and most of the ancient philosophers, suppose the first elements of matter to be altogether hard and solid, incapable of change of figure. For, what are we to make of the meeting of two atoms, or two monads, or by whatever other name we designate these primary particles of matter?

Maclaurin saw this difficulty, when contemplating the collision of bodies, in his *Account of Newton's Discoveries*, book i. ch. 4., and finding that there was no way of preserving the law of continuity inviolate in the case of actual contact, he allowed a breach of it in the collision of hard bodies. He had not the boldness to reject, as Boscovich has done, impulsion and immediate contact altogether, and to insist that a breach of the law of continuity is altogether impossible.

The law of which we are now treating consists in this, that *any variable quantity, whilst it passes from one magnitude to another, passes through all the intermediate magnitudes of the same kind*; by which it is to be understood, not that the different magnitudes are formed by certain small and momentary accessions, for that, as Maupertuis has objected, would be itself a breach of the law of continuity; but that to every particular instant a particular state corresponds, and that the increments or decrements are only formed during continued portions of time.

That this law of continuity exists in nature, the majority of philosophers do admit. Boscovich conceives that a breach of it is altogether impossible; and has endeavoured to prove so, in several of his writings, by the following inductive reasoning.

The continuity is preserved in every kind of motion, since moving bodies describe continued lines. The planets and comets perform their courses in continued lines; their retrogradations are gradual, and even when they appear stationary, there is always some little motion. The light of day comes in by the morning dawn, and departs by the evening twilight. The diameter of the sun, not suddenly, but by a continued motion, ascends above the horizon, or descends below it. Heavy bodies projected obliquely perform, in like manner, their motions in continued lines, viz. parabolas, if we exclude the resistance of the air; or, if we admit that, in curves approaching the hyperbola. And, indeed, they must always have some little obliquity; it being infinitely improbable that any of them should be so projected, as to ascend and descend in a perpendicular line. Every other motion depending on gravity, as well as on magnetism or electricity, must necessarily follow the law of continuity. Gravity acts universally as the square of the distance; and we evidently see that magnetism and other forces of that kind act much in the same way. In all these, therefore, and the motions dependent on them, the law of continuity is strictly observed, as well in the lines described, as in the velocities acquired. Hence in natural motions there is nothing angular; but the change of direction is always made gradually. And even in bodies themselves there are no exact angles; for, however sharp the point or edge may appear in thorns and prickles, the beaks and talons of birds, or the like, the curvature is always evident, at least through the microscope. The same thing is also to be observed in the courses of rivers, the leaves of trees, the twigs and branches, stones, and the like. In short, if we go through all nature, we find the continuity strictly adhered to, if all things be rightly considered; and it may be enough to challenge a single instance to be produced to the contrary, or where the continued connection is altogether undiscoverable.

From this ample and general inductive reasoning, Boscovich would infer that the law of continuity is really universal; and that, so far from conceding it in those cases where observation seems to contradict it, it becomes us rather to search for some explanation by which they may be reconciled with the general law. To do otherwise, would be to contradict one of the fundamental principles of sound philosophy. For in the investigation of the general laws of nature, there is scarcely any other mode of procedure than by induction. By its means, extension, figurability, mobility, impenetrability, have been always, even by the ancient philosophers, admitted as properties of matter; and, in like manner, later philosophers have to these added inertia and general gravity. And although even in these, there appear to be some bodies which admit of a deviation from these general laws, yet a careful examination enables us to give a rational explanation of such cases, reconcileable with them; and therefore we consider such cases as no ways militating against the acknowledged principle. For example, because we see so many of the bodies that we have among our hands resist others when we try to make them occupy the same place, and rather giving way when the resistance is unequal, we admit the impenetrability of bodies; nor does it prevent us from doing so, that there are some which may insinuate themselves into other and even very hard bodies, as oil into marble, light into glass and gems; for this phenomenon can be easily reconciled with impenetrability, by saying that these bodies penetrate through the pores and openings of the others.

Now the proofs by induction of the law of continuity, are as abundant and as convincing as those for the impenetrability of matter. We sometimes make abrupt passages in our minds. Thus in physics, if we conceive the length of a day to be the interval from sunset to sunset, or from sunrise to sunset, we say, the preceding day differs from the following by some seconds, where there appears no intermediate day which differs less: but if we take all the places on the same parallel, we find a series composed of days of all the intermediate lengths, the first of which was the preceding, and the last, the following day above spoken of. In like manner, we say one oscillation of the pendulum is shorter than the preceding, not observing, that if we were to subdivide the arcs, and compare corresponding parts, we would find the change of velocity gradual throughout the whole course of the oscillation. The *saltus*, therefore, is not in nature, but in our minds. We are often apt to confound a quick motion with an instantaneous one; and to suppose something done in a moment, which, in fact, is done in a continued, though very short space of time. Thus some will say, that a stone thrown from the hand, or water spouting from a vessel, acquires instantaneously a finite velocity. But in the former case it is evident, that a finite velocity can by no means be produced in a moment. There must be some time, however little, for the mind to act upon the nerves and muscles, for the extension of the fibres and the like; and if we would give any sensible velocity to the stone, the hand must be drawn back, and the stone held for some time, until by returning it forwards, and perpetually accelerating it, we communicate to it the requisite velocity. In like manner, the ball is not thrown out abruptly from the gun: for a certain space of time will be requisite ere the whole of the powder be inflamed, the air dilated, that by its elasticity the ball may be gradually accelerated.

A breach of it impossible.

But however satisfactory this inductive reasoning may be, our author has adduced other arguments to shew, that a breach of the law of continuity is metaphysically impossible. These arguments he derives from the very nature of continuity. As was long ago observed by Aristotle, the limit which joins the precedent conditions with the consequent, must, in that respect, be common to both, and therefore indivisible. Thus the superficies, which is the common boundary of two solids, is destitute of thickness; the line separating the two parts of a continued surface, has no breadth; and a point separating the segments of a continued line, is altogether indivisible. Thus also in time, when an hour ends, the next immediately begins, the common boundary being an indivisible instant. Neither can two instants be chosen so contiguous, but that a finite portion of time must intervene between them, which is again divisible *ad infinitum*. Thus also in any variable quantity, since all variations are made in time, they all partake of its continuity; and to every instant which may be assigned, a certain state of the variable quantity will correspond: As after the sixth hour we cannot have the 9th, without having previously the 7th and 8th; so in motions, you cannot go from the distance 6 to the distance 9, without previously passing through the distances 7 and 8; for in that instant of passage, you would be both at the distance 6, and at the distance 9, which is evidently impossible. The same thing may be said of density, of heat and cold in the thermometer, and the weight of the air; and, in fine, of all variable quantities.

But against this argument it may seem, that in creation from nothing, or annihilation, the passage is made *per saltum*: Our author replies that it is not; that, in these cases, there is no passage from one state to another; that non-existence is no state, but a mere nothing, which, of course, has no properties or boundary. Of a finite, real and existing series, there must be real and existing limits: But nothing has no limit; and therefore, in creation, a body passes over no intermediate state. It begins to exist, and to have a state, and existence is not divisible. In passing from positive to negative quantities, have we not a *saltus*? In changing from attraction to repulsion, have we not a breach of continuity in our very theory itself? To this we answer, that the attractive forces diminish through all intermediate degrees down to nothing, through which, as a limit, they pass to repulsion. Nothing here, however, does not properly imply non-existence, but is merely relative, and expresses the limit between two different variable states of existence, as the single parabola is the limit between the infinite variety of the ellipse and hyberbola.

In this sense, too, rest is a real state of existence; so is no velocity, or perseverance in the same place, no force or perseverance in retaining the previous velocity; and so of others. These differ greatly from non-existence. When, in the solution of a problem, we arrive at a quantity of the former description, the determination is real, though of a peculiar kind. But we arrive at an expression of the latter kind only, where the problem is impossible.

From what we have now said, we believe that the general law of continuity is sufficiently manifest; and it will be hardly necessary for us, as Boscovich has done, to prove that, upon the same principles, the change from one velocity to another never takes place but by passing through all the intermediate velocities. For example, if there was an abrupt passage from the velocity 6, arising from all the preceding circumstances affecting the moving body, to the velocity 9, then, at the very instant of the passage, we have a determination to two different velocities, which, as already shown, would be absurd.

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It is therefore evident, that the whole velocity of a body, can neither be created nor extinguished in a moment: and consequently, in the collision of two bodies, there must be a breach of the law of continuity, if the contact takes place with any determinate difference of their velocities. Let us see what must happen, if no such breach be admitted, since these bodies cannot come into contact with the previous velocities. The velocities must begin immediately to change, either by the increase or diminution of one or both. The cause of such a change as this, is called a force; and there must consequently be some force acting to produce this effect, even though the bodies have not yet come into contact.

To prevent the breach of continuity, it would be sufficient that the forces should act only on one of the bodies; but from the principle of the equality of action and reaction, for which there is abundant evidence by induction, we must suppose, that this force is mutual between them, increasing the velocity of the one at the same rate as it diminishes that of the other. This is, in fact, producing a sort of opposite velocities, by which, if the bodies were impressed alone, they would be made to recede. The force is therefore repulsive, and it becomes us to enquire into the laws by which it is regulated. In the case above mentioned, where A, moving with the velocity 6, is overtaken and hit by B, moving with the velocity

12, it would be enough, that the repulsive power which we have now discovered, should be able to extinguish the 6 degrees of difference of velocity, and the actual contact might take place at the very moment in which the velocities became equal. But should B, following with 20 degrees of velocity, hit A with 6, the difference or relative velocity is 14; and though the repulsive power be equal to the extinction of 6 degrees, there is still a difference of 8 at the time of contact: nay, there must be even a greater difference than 8 degrees; for the repulsive power will have less time to act than in the former case, and therefore, agreeably to constant experience, it must produce a less effect than before.

The contact of the two bodies would therefore take place, although the difference of their velocities be even greater than 8 degrees, and we should have the same breach of continuity that we have already demonstrated to be impossible. Nature therefore will provide for this, as for the former case; and at a distance more minute, an additional force will take away all the 14 degrees of difference even before the contact takes place. But when we have come thus far, it is evident that there can be no limits assigned to the increase of the repulsive power, which acts between the two bodies hindering their approach. It must be equal to the extinction of any velocity, however great. We must therefore admit, that the repulsive forces, as the distances are diminished, increase *ad infinitum*: that is, we must admit the existence of the asymptotic arc ED of the curve in Fig. 1st, which exhibits the law of impenetrability, and *that the actual contact of bodies or particles is altogether impossible.*

This perhaps is not the only asymptotic arc in the curve of forces: There may be others, or a succession of them—a circumstance which opens a fertile field of contemplation. But we proceed to those branches of the curve for which we have undoubted evidence.

In the first place, the gravity of all bodies, which is daily experienced, evinces, that the repulsive forces which we discover in the smaller distances, is by no means indefinitely extended; but in the greater distances, gives place to a force of attraction: and the laws of Kepler, in astronomy, so happily reduced by Newton under the single law of general gravity, sufficiently shew, that this attraction, if it does not extend *ad infinitum*, must, at least, pass as far as the utmost limits of the planetary and cometary system. The curve, expressing the law of forces, has therefore another arc STY, which, to all sense, is the same with that hyperbola of the third order, of which the ordinates are reciprocally in the duplicate ratio of the distances or abscissæ. But it is evident that there must be some place E, where this curve cuts the axis, and in which the transition is made from attraction to repulsion.

The phenomena of vapour arising from water, and of air produced from fixed substances, exhibit to us two other limits of the same kind: For in these there is at first no repulsion, but rather an attraction and coherence. Nevertheless their expansion and elastic force are afterwards sufficient manifestations, that a repulsive force exists among their particles. We have therefore, first, a transition from the primary repulsion to attraction; then to repulsion again; and lastly, to the general attraction of gravity. But indeed there appears to be many such limits and transitions; for without them the numerous effervescences and fermentations in which the particles approach and recede so variously, and the phenomena especially of soft bodies, are not otherwise to be explained.

Boscovich's theory of Natural Philosophy.

The whole form of the curve of forces being now elicited, by direct reasoning, from the phenomena, it remains to determine the constitution of the primary elements of matter, as deduced from those forces; and this being done, the theory, as proposed in the beginning of this account of it, may be legitimately applied to mechanical and physical science.

The first elements of matter are not in contact;

Seeing that the repulsive force, in lessening the distance, increases *in infinitum*, it is evident, that no particle of matter can be contiguous to, or in contact with, another. The first elements of matter must therefore be altogether simple, and composed of no contiguous parts. They must be also inextended.

are inextended;

We need not therefore be perplexed with the questions, whether any division of a real being can be carried *ad infinitum*? or, whether the number of distinct and separable parts of matter be finite or infinite? or any of the numberless difficulties which arise from the supposed continued extension of body, and which philosophers have hitherto been so much puzzled to explain: For if the first elements of matter are points altogether inextended, indivisible, and separated by some interval, the number in any given mass must necessarily be finite. The density of a body may be indefinitely increased as well as diminished; since the distance between the particles may be indefinitely diminished; but upon the supposition of solid and extended elements, there is an evident limit to the increase of density, even when the particles come into contact.

and homogeneous.

With the simplicity and inextension of the primary particles, we should also admit their homogeneity. The arch of the curve expressing impenetrability, and the exterior arc exhibiting gravity, are always the same; for all bodies are equally impenetrable, and for their quantity of matter are equally heavy. It is therefore exceedingly improbable, that there should be any variety in the other parts of the curve among different particles; or that it should be different in different directions from the same particle. Besides, such a variety is unnecessary, since it can, as we shall soon see, be sufficiently provided for, from the variety in the number and position of the points composing the sensible particles of matter.

The objections to this doctrine, which are urged by the Leibnitzians, derived from the principle of indiscernibles, and of the sufficient reason, (See LEIBNITZ,) Boscovich removes, by expressing his conviction, that the infinite mind of the Divinity can perceive the individuation of objects altogether similar; and, with respect to the sufficient reason, he contends for its falsity, as being founded on the principle of necessity, maintained by Leibnitz; and as to the argument from induction, derived from the wonderful variety we find in nature, where not two leaves in a forest are exactly the same, he says, all this variety may be completely produced by the various arrangement of the points of matter, seeing their number is so great. This he illustrates, by supposing an immense library of books in various languages, the letters in which were formed by small round points, placed so near each other, that the interval could only be discovered by the help of the microscope. Now should any person, ignorant of languages, and of this kind of writing, begin diligently to examine this collection, he would first find out of the vast multitude of words, a certain number which occurred often in some of the books, and in others never appeared; and collecting these together, he might form dictionaries of the several languages. But upon further investigation, it would be found, that the whole of these words were expressed by the help of only twenty-four different letters; and here he must stop, unless he could procure farther assistance: But suppose him provided with a microscope, he would at length discover, that by the various arrangements of single points, were formed the whole of the letters, words, languages, and books, on various subjects, that composed this great collection. Just so, says Boscovich, is it in chemistry, where the farther we push our analysis, the more nearly do we arrive at elements, simple and homogeneous. And thus we have detailed the whole of the proofs which Boscovich has given for his system: but before going farther, it will not be improper to follow him also in refuting some of the objections which have been, or may be, proposed against its general reception.

Objections to the theory answered.

Against mutual attractive and repulsive forces, it has been usual to object, that they are no better than the occult qualities of the Peripatetics, and that they induce action at a distance. The same objection has been made to the Newtonian theory of gravity; but the answer is easy, we observe the effects, which are sufficiently manifest. We must admit for them an adequate cause. Whether that be the immediate act of the Creator, or some mediate instrument which he employs, we are unable to determine. With respect to action at a distance, there is, at least, nothing more occult in that, than in the production of motion by immediate impulse. Newton has given a satisfactory explanation of the phenomena of light; and has reduced mechanical astronomy to rigid calculation, without employing impulse; and it is highly probable, that we may be equally successful in other departments of nature.

It has been objected, that the theory itself admits of a breach of continuity, in passing suddenly from repulsion to attraction; but this we have already shown to take place, by passing through all the intermediate degrees, in the same manner as the change is made from positive to negative quantities, by a continual subtraction.

It may be objected, that the complication of the curve, made up of many arches, repulsive and attractive, is no better than the old doctrine of the arbitrary qualities and substantial forms. Boscovich answers, that repulsion is but a negative attraction, as may be illustrated by algebraic equations, and geometric loci: and again, that, supposing us entirely ignorant of the law of mutual forces, it is at first much more likely, that the curve, which expresses it, is of a high than of a low order; that is, it is much more likely that it frequently intersects the axis, or has frequent flexures, than otherwise; seeing that the higher orders of lines are so much more numerous than the lower. But, independent of this conjecture, the form of the curve has been derived by positive argument from the phenomena; and it is well known, that there are many curves which, from their nature, must form frequent flexures and intersections with the axis. To our minds, the mutual congruity of straight lines, upon which, by the way, the whole of our geometry depends, makes them appear the simplest of any, and others to be the more complicated, only as they remove the more from the right line. But all continued lines of uniform nature are equally simple; and a mind may be conceived, to which the parabola, for instance, might appear as essentially simple, as to us appears the straight line. But besides this general reply to the objection before stated, Boscovich has shewed, in his Dissertation *de Lege Virium*, that this curve is uniform and regular, and may be expressed by one general algebraic equation.

For this purpose, six conditions are proposed, as requisite to the complete expression of the law of forces. 1st, The curve must be regular and simple, and not composed of an aggregate of different curves. 2d, It must cut the axis CAC′ only in certain given points, at equal distances on each side, as AE′ AE, AG′ AG, AI′ AI, and so forth. 3d, To every absciss there must be a corresponding ordinate. 4th, To equal abscisses on either side, equal ordinates must correspond. 5th, The straight line AB must be an asymptote to the curve on either side, and the asymptotic area BAED must be infinite. 6th, The arch, intercepted between any two intersections, may be varied at pleasure, may recede to any distance from the axis, and may approach at pleasure to an arch of any other curve, cutting, touching, or osculating it, in any place, or in any way that may be proposed.

I. That these conditions may be fulfilled, he finds an algebraic formula which contains his law, calling the ordinate as usual y, and the abscissa $=x$, he takes $xx=z$. Let all the values of AE, AG, AI, &c. be taken with the negative sign, and let the sum of the squares of these values be called a; of the products of every two squares be called b; of every three c, and so on; and let the product of all of them be called f, and let the number of values be called m. Now put

$$z^m+az^{m-1}+bz^{m-2}+cz^{m-3}+, \text{ \&c. } +f=\mathrm{P}.$$

If we suppose $\mathrm{P}=0$, it is clear that all the roots of the equation will be real and positive, namely the squares of the quantities AE, AG, AI, which are the values of z, and since $x^2=z$, $x=\pm\sqrt{z}$, it is plain that the values of x are as well AE, AG, AI, positive, as AE′, AG′, AI′ negative.

II. Next, let any given quantity be taken for z, only that it may not have a common divisor with P; and z vanishing, it will also vanish; and z being made an infinitesm of the first order, it will also become an infinitesm of the same, or a lower order, as any formula $z^r+gz^{r-1}+hz^{r-2}$, &c. $+b$, which being put $=0$, may have any number of imaginary, and any number of, and whatever real roots; (but none of them $=$AE, AG, &c. either positive or negative;) if then the whole be multiplied by z, let that be called Q.

III. If now we make $P-Qy=0$, this equation will fulfil all the conditions proposed but the last; and that may be fulfilled in an infinite number of ways, by properly determining the value of Q.

For, in the first place, since the values of P and Q, put equal to 0, have no common root, they have no common divisor, and therefore the equation cannot by division be reduced to two; it is therefore simple, and expresses one simple and continued curve, which is not composed of others. This is the first condition.

Next, a curve of this kind will cut the axis CAC′ in all the points E, G, I, E′, G′, &c. and only in these. For it can only cut the axis in those points in which $y=0$, and it will cut it in all these. Besides, when $y=0$, $Qy=0$, and since $P-Qy=0$, therefore $P=0$, which can only happen when z is one of the roots of the equation $P=0$; that is, as we have already shown, only in the points E, G, I, &c. or E′, G′, &c. Wherefore the quantity y vanishes, and the curve cuts the axis only in these points. That the curve will cut it in these points, is also clear from this, that in each of them $P=0$, therefore also $Qy=0$, and it is not $Q=0$, for there is no common root of the equations $P=0$ and $Q=0$; therefore it must be $y=0$, and consequently the curve meets the axis: which fulfils the second condition.

Besides, since $P-Qy=0$, $y=\frac{P}{Q}$; and if any abscissa x be given, z is also given, and therefore P and Q are single and determined, and therefore y is also single and determined. To every absciss x, therefore, there is a corresponding ordinate y, and only one. This is the third condition.

Again, whether x be assumed positive or negative, while it is of the same length, the value of $z=x^2$ is always the same; and therefore the values of P, Q, and consequently of y, must be the same. So that if equal abscisses be taken on each side of A, the corresponding ordinates will be equal: which is the fourth condition.

If x be diminished *in infinitum*, whether it be positive or negative, z will also be diminished *in infinitum*, and will be an infinitesimal of the second order. Wherefore in the value of P, all the terms will decrease *in infinitum*, f only excepted, because all the rest besides it are multiplied by z; and thus the value of P will be as yet finite. But the value of Q, which involves the formula drawn entirely into z, will diminish *in infinitum*, and will become an infinitesimal of the second order. Therefore $\frac{P}{Q}=y$ will *increase in infinitum*, and becomes an infinitely great quantity of the second order. Wherefore the curve will have for its asymptote the straight line AB; and the area BAED will increase *in infinitum*, and if the positive ordinates y are taken towards the parts AB, and express the repulsive forces, the asymptotic arc ED will be towards the same parts AB: which was the fifth condition.

It is clear, then, that however Q be assumed with the given conditions, the first five requisites will be fulfilled. Now the value of Q may be varied in an infinite number of ways, so as still to fulfil the conditions with which it was assumed. And therefore the arc of the curve intercepted between the intersections may be varied in infinite ways, so that the first five conditions may be fulfilled. It may therefore be varied so as to fulfil the sixth condition. For if there be given however many, and whatever arches of whatever curves, providing they be such that they recede always from the asymptote AB, and thus no right line parallel to that asymptote cut these arches in more than one point, and in them let there be taken as many points as you please, and as near one another; it will be easy to assume such a value of P, that the curve may pass through all these points, and the same may be varied infinitely; so that still the curve will pass through all the same points. Let the number of points assumed be what you please $=r$, and from every one of such points, let right lines be drawn parallel to AB, as far as the axis CAC′, which must be ordinates of the curve that is sought; and let the abscisses from A to the said ordinates be called M^1, M^2, M^3, &c., and the ordinates N^1, N^2, N^3, &c. Let there now be taken a certain quantity $Az^r+Bz^{r-1}+Cz^{r-2}+Gz$, and let this quantity be supposed equal to R. Then let another such quantity T be assumed, so that z vanishing, any term of it may vanish, and so that there be no common divisor of the value of P, and of the value of $R+T$, which may be easily done, seeing all the divisors of the quantity P are known. Let it now be made $Q=R+T$, and then the equation of the curve will be $P-Ry-Ty=0$. After this, let there be put in the equation M^1, M^2, M^3, successively for x, and N^1, N^2, N^3, &c. for y; we shall have r equations, each containing values of A, B . C . . . G, of one dimension, besides the given values of M^1, M^2, M^3, &c. N^1, N^2, N^3, &c. and the arbitrary values, which in T are the coefficients of z.

By these equations, which are in number r, it will be easy to determine the values of A, B, C, ... G, which are likewise in number r, assuming in the first equation, according to the usual method, the value A, and substituting it in all the following equations, by which means the equations will become $r-1$. These, again, by throwing out the value B, will be reduced to $r-2$, and so on, until we come to one only, in which the value Q being determined, by means of that, in a retrograde order, all the preceding values will be determined, one by each equation. The values A, B, C, ... G being in this manner determined in the equation $P-Ry-Ty=0$, or $P-Qy=0$, it is clear that the values M^1, M^2, M^3, &c. being successively put for x, the values of the ordinate y must successively be N^1, N^2, N^3, &c.; and therefore that the curve must pass through these given points in those given curves, and still the value Q will have all the preceding conditions. For z being lessened beyond whatever limits; seeing all the terms of the value of T are lessened which were thus assumed, and likewise the terms of the value R are lessened, which are all multiplied by z, and besides this there will be no common divisor of the quantities P and Q, seeing there is none of the quantity P and $R+P$.

But if two of the nearest of the points assumed in the arches of the curves, on the same side of the axis, be supposed to accede to one another, beyond whatever limits, and at last to coincide, which will be done by making two M equal, and likewise two N equal, then the curve sought will touch the arch of the given curve there, and if three such points coincide, it will *osculate* it; nay, as many points as we please may be made to meet together where we please, and thus we may have *osculations* of what order we please, and as near one another as we please, the arch of the given curve approaching as we please, and at whatever distances we please, to whatever arches of whatever curves, and yet still preserving all the six conditions required for expressing that law of the repulsive and attractive forces. And whereas the value of T can be varied in infinite manners, the same may be done in an infinite number of ways, and therefore a simple curve, answering the given conditions, may be found out in an infinite number of ways. Q. E. F.

Plate LXV. Fig. 1.

It would be very possible to divide this curve, though single in itself, into two or more. Thus, if any one should wish to consider general gravity as accurately reciprocally as the squares of the distances, he may describe on the attractive side the hyperbola which expresses it, which, in fact will be a continuation of the leg VTS, then to each of the ordinates *a g*, *h d*, of the curve of forces, Fig. 1. he may add the ordinates of this new hyperbola towards the parts AB, beginning at the points *g* and *h* of the curve. By which means a new curve will arise, coinciding to sense with the axis, towards the parts V *p*, but elsewhere at a distance from it, and even winding about it, if the vertices F, K, O, are more distant than the hyperbola is. In this way even many different forces may be expressed, which, as in the resolution of forces, may sometimes be found useful in more readily demonstrating the effects. And, in fact, it will be a true resolution of forces: but, nevertheless, it is merely the offspring of the mind.

Objections answered.

As we have mentioned the decrease of gravity to be accurately in the reciprocal duplicate ratio of the distance, which is generally admitted by the cultivators of mechanical astronomy, it may seem an objection against our theory, that it departs so widely from that law. But, in the first place, the action of the particles in the lesser distances does very much differ from that law, seeing that vapours, which exert such a great force of expansion, must have, in these distances, a repulsion to each other, and not an attraction, and that even the attraction of cohesion is vastly greater than that which should be produced by general gravity; and hence some of the disciples of Newton have supposed a force corresponding to this formula $\frac{1}{x^3}+\frac{1}{x^2}$, the former part of which is immensely less than the latter when x is much greater than the assumed unity, but is greater than it when x is much less; so that in the greater distances the force is very nearly inversely as the squares, and in the less very nearly as the cubes of the distances. So that the duplicate ratio is not strictly adhered to even among the Newtonians.

It has indeed been demonstrated by Newton, that the line of apsides of the planets would have an immense motion, if the ratio of forces were very distant from being inversely as the squares of the distances. But they have some motion, and it is not enough to say that this is owing to the disturbing force of the other planets, for this is not yet accurately demonstrated; and indeed it is only after many attempts and approximations, that a partial solution has been given of the celebrated problem of three bodies, in which there is sought the motion of three bodies acting on each other in the inverse duplicate ratio of the distances. It may be guessed, therefore, how far we yet are from having any demonstration of the strict accuracy of this law of forces.

To many the greatest difficulty in the theory appears to be the total rejection of immediate contact, which, they think, is evidently shown by the testimony of the senses; a rod, they say, should be used to him who denies contact. But it is admitted, that bodies approach so near each other as to leave no sensible distance between them; and that the resistance we experience is produced by the repulsive power, which gives us the same sensation as actual contact is supposed to do; the contact being *physical*, although not *mathematical*.

So much for the objections which may be made to the proposed law of the forces. Let us next enquire into those made to the constitution of the primary elements, deduced from that law.

Obje to th ment

In the first place, there are many who can by no means be persuaded to admit the existence of points altogether indivisible and inextended, alleging that they cannot possibly form any idea of them. Because all the bodies cognisable by the senses are extended, we are apt to look upon extension as essential to matter. But this error may be corrected by reflection; and the idea of an inextended point may be formed by the help of geometry, and that very idea of continued extension, which is so familiar to our senses. Thus the common section of two contiguous parts of a plane surface is a mathematical line, destitute of breadth, and the meeting of two such sections is an indivisible point.

We may here observe that Zeno among the ancients, and Leibnitz among the moderns, held that the first elements of matter were simple and inextended; but they were guilty of an inconsistency in maintaining that these were contiguous to each other, and thereby comparing a continued extension of indivisible and inextended elements.

There are some who say that if the elements of matter are void of extension, they are in no respect different from spirits. But the chief difference between body and spirit is, that the one is tangible and incapable of thought or volition, the other may think and will, but does not affect the senses. For sensibility does not consist in extension, but in impenetrability, by which the fibres of the body are affected, and the rays of light are reflected.

But if substances capable of cogitation and volition were endued with the same law of forces, would they not produce to our senses the same effects as these points? We answer, that it is not our business to enquire whether such a conjunction could take place or not.

Such a body would neither be matter nor spirit, but a thing differing from both; from the one by its power of cogitation, as from the other by its inertia and impenetrability.

Application of the Theory to Mechanics.

The second department of our subject is, the application which may be made of this theory to the explanation of the principal laws of equilibrium, and other parts of elementary mechanics. But, in the first place, a few observations are to be premised respecting the curve of forces, upon which all the phenomena depend. These observations relate to the arches of the curve, to the areas intercepted between it and the axis, and to the points in which the curve cuts the axis.

The arches are either repulsive or attractive, according as they lie on the side of the asymptotic arc EG, or on the opposite side. The arches may touch the axis, or they may bend from it with a contrary flexure, as P*efg*R, Fig. 1.

The area corresponding to any small portion of the axis may be ever so great, and that which corresponds to a great segment may be ever so small, according as the curve recedes very far from the axis, or approaches very near to it. It were easy to demonstrate this, but we shall not occupy the reader's time with it. The area included between an asymptote and any ordinate, may be either finite or infinite. The former, when the ordinate increases in a less ratio than the reciprocal simple ratio of the abscisses; the latter, when it increases in that or in a greater ratio, as may be thus proved. Take x the ordinate as A*a*, Fig. 1, and y the absciss *ag*, and let $y^n = \frac{1}{x^m}$ or $y = x^{-\frac{m}{n}}$; then the fluxion of the area $y\dot{x}$ will be $= x^{-\frac{m}{n}}\dot{x}$ and its fluent $\frac{n}{n-m} x^{\frac{n-m}{n}} + A$, or since $x^{-\frac{m}{n}} = y$, we have $\frac{n}{n-m} xy + A$; A being a constant quantity. Since the area begins in A, the beginning of the abscisses, if $n-m$ be a positive number, and therefore $n > m$, the area will be finite, and $A = 0$: But the area will be to the rectangle A*ag* as n to $n-m$; which rectangle, since *ag* may be great or small without limit, is also without limit. Its value is infinite, if $m = n$, for then the divisor $= 0$; much more then if $m > n$, that is, when the ordinate increases in a greater than the reciprocal simple ratio of the abscisses. This observation was necessary, that we might have some scale of velocities in the access or recess of one point from another. For, as already observed, when the spaces are expressed by the abscisses, and the forces by the ordinates, the area described by the ordinate expresses the increment or decrement of the square of the velocity.

With respect to the points in which the curve meets the axis, they are either points of section, as E, G, I, or of contact. In the former, there is a transition from attraction to repulsion, or the contrary, and these by our author are called limits. These limits are of two kinds; first, where the transition, by an increase of distance, is from repulsion to attraction, as is the case at E, I, N, R, which are called *limits of cohesion*, for in such a situation the points resist all change of position, viz. separation by means of the attractive force which immediately begins to operate, and mutual approach in like manner by the incipient repulsion. But in the limits of the second kind, as G, L, P where the transition, by an increase of distance, is from attraction to repulsion, although the points in such situations do not exert any force on each other, yet the smallest change of distance produces a very important alteration: for if they be in the least separated, the repulsive force then acting will remove them still farther asunder; and, on the other hand, if their distance be diminished in the least, they will tend together more and more. Such limits, therefore, are by Boscovich called limits of *non-cohesion*.

Limits of cohesion.

Limits of non-cohesion.

The limits of cohesion may be powerful or weak, according to the angle at which the curve intersects the axis, or the distance to which it removes from it. *t*N*y* exhibits a limit of the former; *c*N*x* of the latter kind. The most powerful kind of limit at first, at least, is, where the curve at cutting the axis has the ordinate for its tangent, as X, Fig. 6.; and, in like manner, the weakest is, when the axis is the tangent, as Y Fig. 6., both being points of contrary flexure.

Plate LXV. Fig. 6.

This being premised, we now proceed to the consideration of some of the combinations of the points of matter, and of their mutual actions on each other.

Of the system of two points.

Plate LXV. Fig. 1.

If two points be placed at such a distance from each other, as is equal to that of some limit from the beginning of the line of abscisses, as AG, AE, &c. and without any kind of motion, they must evidently remain there at rest, since they have no mutual action. But if the points be placed out of limits of that kind, they will immediately begin to approach or recede by equal intervals. The force continuing in one direction, will carry them to the distance of the nearest limit, which will, of course, be a limit of cohesion. They will arrive at that with an accelerated motion, and the squares of their velocities will be proportional to the area described by the accompanying ordinate. But they will not stop at this limit. Having arrived there with a motion continually accelerated, they will go on beyond it, and, of course, they will be immediately acted on by a force directly opposite. Their motion will therefore be retarded until the velocity be totally extinguished, by the area under this second branch of the curve becoming equal to that intercepted between the ordinate at the original place of the point and the limit aforesaid. Should the area of this second segment be too small, the original motion of the points will go on; they will pass the second limit of non-cohesion, if they arrive at it with the smallest velocity. Beyond that the original motion will be again accelerated by an action of the same kind as at first, and the points will pass another limit of cohesion. A second retarding force will now act, and may at length be equal to the extinction of the velocity. If that does not take place exactly at a limit of non-cohesion, which is scarcely possible, the bodies will be returned again with a series of motions just the contrary of the former, and they will arrive at the same position from which they departed, and they will continue therefore to oscillate in this way for an indefinite length of time.

Cor. The velocity will be greatest at the limits of cohesion, and least at the limits of non-cohesion. No velocity of approach can overcome the repulsion expressed by the first or asymptotic arc, ED. But if the points be placed at first within that arc, the repulsive force may, perhaps, be so great as to carry them over all the subsequent arches, and even through that which expresses the law of general gravity; the points would therefore recede *ad infinitum*.

All this would be the case, were these points left entirely to themselves. But if other external forces act on them, the case might be very different; for these forces may possibly retain the points in limits of cohesion or non-cohesion, or even in situations out of these limits. Should the two points be projected obliquely, with equal and opposite motions, they would revolve in equal curves round the middle point of the line joining them, which curves, if the law of forces were given, might be formed by the inverse problem of central forces. And it may be observed, that if two points be brought towards each other from ever so great a distance, not directly, but with some small obliquity, (and, indeed, direct motion must be hardly possible,) they will not return back, but, from the nature of central forces, will revolve round the middle point of space, always near each other. Although the interval be not cognisable by the senses, this remark will be hereafter of use, when we come to treat of cohesion and of soft bodies.

System of three points.

In treating of the system of three points, the subject, if generally stated, is reducible to the two following problems; viz. 1. Given the position and distances of these points, to find the forces acting on any one composed of the forces by which it is urged by the others, the common law of these forces being given by the first figure; and, 2. Given the law, to find the motions of these points, each of them being projected with given velocities and directions from given places.

The first problem may be solved with comparative facility, either geometrically or analytically, by means of the curve of forces. The second, if it be requisite to define the curves described in every case, either by construction or calculation, exceeds, although the number of points be only three, the powers of the methods yet known; and is, in fact, no other than that celebrated problem of three bodies, so much sought after by the most celebrated mathematicians of our time, and to which, only in some particular cases, and with the greatest limitations, they have been able to give any solution.

Plate LXV. Fig. 2.

It may be remarked, that if the three points be A, B, and C, Fig. 2., and if the distance of any two of them AB, be bisected in D, DC joined, and one third of it be taken as DE, however the points be moved by any projection and their mutual forces, the point E will either be at rest, or move uniformly in a straight line. This depends on the properties of the centre of gravity. Therefore, if the points be left to themselves, C will approach to E, and D will likewise, with half of the velocity of C; or else they will recede, or move sidewise; but still preserving their relative position and distances with respect to E.

As to their mutual forces. Let there be assumed in Fig. 1., abscisses in the axis, equal to the straight lines AC, BC, Fig. 2.; and taking out the corresponding ordinates, set off CL if the ordinate to AC be attractive, CN if it be repulsive; and, in like manner, set off for BC, CK, or CM. Then, completing the proper parallelogram, its diagonal CF or CH, CI or CG, will exhibit the direction and magnitude of the resulting force, according as the composing forces are both attractive or both repulsive; or one attractive and the other repulsive.

Now, if the point C be supposed to be found always in some indefinite line DE, the resulting force may be found for any number of points in that line; and these ordinates being set off at right angles to the line DE, a curve drawn through their vertices would express the force of the points A and B, at any point in the direction DEC.

Every new direction would require its particular curve; and the force acting on C, at any point in the same plane, could only be expressed geometrically by the perpendicular distance from that plane to a curve superficies.

But it would be more satisfactory to express, not only the magnitude, but the direction of the resulting force. For which purpose, draw FO at right angles to CD, meeting it in O. One curve may express the amount CO of the force, in the direction DEC, for every given distance; and another the value of the perpendicular FO; taking the ordinate on either side of its line of abscisses, according as the action was towards B or towards A.

The force resulting from the action of any number of points disposed in the same superficies, may, in like manner, be expressed by the perpendicular distance at any situation, from a plane to a curve superficies. If there be any of the points, in such a system, situated out of the plane, the force cannot be expressed geometrically in this way, since solidity is the limit of geometric composition. But we are surprised to find a mathematician of Boscovich's eminence say, that geometry is altogether incapable of expressing the law in that case; although it may be done by an algebraic equation with four indeterminate quantities. The *locus ad superficiem* is indeed insufficient. Neither is it necessary to express an equation of three indeterminates. A geometrical construction is possible for the expression of any algebraic formula. Each of them implies a process to be performed. And the geometric locus differs as completely from an algebraic equation of two or three variable quantities, as a table of logarithms from a formula for finding them. In this case, the geometric construction for any number of points is obvious. It is merely a continuation of that composition of forces, by which the action of two was discovered. It can, indeed, only become definite by supposing all the points given in position; we may then find the amount of the force for that position. But the algebraic equation can do no more, since it can only be applied to use by finding an arithmetical value of any of its roots.

All this while, we have supposed the points A and B to be relatively at rest; but it must be evident that the variety is immense, if we take different positions and distances of these points. Boscovich has enumerated many of the more remarkable cases. It will be sufficient for us to notice a few of the more simple, and those especially which may be referred to in the physical application of the theory.

In the first place, the attraction of C towards A and B, in those greater distances at which the curve of forces sensibly coincides with that of gravity, will always be towards D, proportional to the reciprocal of the square of DC, and sensibly double of what corresponds to that distance in Fig. 1. And the case will be the same in masses consisting of any number of points; the attraction being sensibly the sum of the forces of all the points which constitute these masses.

But in those smaller distances, at which the curve winds about the axis, the actions of the points upon each other will sometimes be attractive, sometimes repulsive, and the forces resulting therefrom will be infinitely diversified. So that, although the force of gravity be universal, and depend only on the mass and the distance, yet those properties, which depend on the action of matter at smaller distances, as the reflection and refraction of light, and the separation of colours; the impressions on the various fibres, in tasting, hearing, smelling, and feeling; cohesions, secretions, nutritions, fermentations, precipitations, explosions, and all the phenomena of chemistry; and a thousand others, however various in their effects, may all be satisfactorily explained on the principles of this theory.

Suppose the point C be placed any where in a line DC, perpendicular to AB; or any where in the line joining them, Fig. 3. It is evident that, in the first case, the action of B and A being equal and of the same kind, the access or recess of the point C will be in the line DC; and the curve expressing the forces acting on C, might be found by drawing B *d* equal to any abscisses from Fig. 1.; laying off in it, *d e* its corresponding ordinate; drawing *e a* at right angles to DC, and making the perpendicular *d h* equal 2*da*, on any of the sides for repulsion, and on the opposite side for attraction. The curve will cut the axis in various points; it will also pass through the point D, and have a similar branch on the opposite side of AB; in which, however, the sides expressing attraction and repulsion will be reversed. Each intersection will be a limit, and the point D will be a limit of cohesion or non-cohesion, according as the arch on either side of it is attractive or repulsive. It will also be a weak limit, for the opposite forces of A and B will nearly destroy each other, although the points be a small matter out of the straight line.

In the second case, where the point C is taken any where in the line AB, the curve which expresses the law of forces may be thus found. Fig. 4. For any point *d*, assume two abscisses in Fig. 1., the one equal to A *d*, the other to *d* B; and taking the corresponding ordinates, lay off *d h* equal to their sum or their difference, according as they are of the same or of different kinds, assuming one side of the axis AB to express excess in repulsion, and the other excess in attraction. The curve will pass through the point D, and the directions will be changed as in the former case. If a perpendicular be drawn through B, it will be an asymptote to the curve on either side, since the repulsion of B will prevent absolute contact. There may be several limits or intersections, either between A and B, or beyond them; and according to the distance at which we suppose A and B to be posited, the attractive force of the one may neutralise the repulsive force of the other, or double its attractive force, and *vice versa*.

PLATE LXV. Fig. 5.

Let the three points A, D, B, be in a straight line, their mutual action will be 0, if the three distances AD, DB, AB, be each the distances of limits. The point D may be attracted by both extremes, repelled by both, or attracted by one and repelled by the other. These cases are, however, vastly different; in the first, if D be removed from its place to C, it will return to it again; in the second it will recede still farther. In the former case we have an instance of cohesion; in the second of non-cohesion. In the third case, it is plain that the point D will move away from the repelling end, and approach the attractive.

In the first case, the three points may retain, to sense, their rectilineal situation, however powerful the force may be which tends to disturb them. If the force be in the direction of the line, it will be sufficient if, for the middle point, the attraction increases very much with the increase of distance from either extreme; and for either extreme point, if the repulsion decreases very much with the increase of distance from the middle. Should the force be impressed perpendicularly, as, for example, if the middle point be urged in the direction DC, then the forces may be so powerful as at a very small distance to resist any other of the same kind. Should the force constantly urge the point D towards C, and AB to the opposite side, we have a bending or inflexion; and, in like manner, forces acting in the direction of the line joining the points ADB, will produce a compression or dilatation. The forces resisting this may be so powerful as to render this change almost imperceptible, or they may be weak, so as to admit of considerable deviation from the original situation. In this manner we may have an idea of rigidity, and of flexibility and elasticity.

Fig. 5.

If the two forces AQ, BT *be perpendicular to* AB, *or parallel to one another, the third force* CF *will also be parallel to them and equal to their sum, but in the contrary direction.* For, draw CD parallel to them, and also KI to AB; and since CK=VB, the triangle CIK is equal and similar to BTV or TBS; and, therefore CI=BT, and IK=BS=AR=QP. Wherefore, if IF be taken =AQ, and KF drawn, the triangle FIK=AQP; and, therefore, FK is equal and parallel to AP or LC, and CLFK is a parallelogram, the diameter of which, CF, expresses the force of the point C, is parallel to AQ and BT, and is equal to their sum, but in the contrary direction. Also, since SB : BT, as BD : DC, and QA : AR : : DC : DA; therefore, by equality, AQ : BT : : BD : DA; that is, *the forces in* A *and* B *are in the reciprocal ratio of the distances* AD, DB, *from the right line* CD, *drawn through* C *in the direction of the forces.*

This theorem is general, and applies equally to the mutual action of three points having any position, whether in a right line or not. But its application to unequal masses makes it much more general, and will lead us to the equilibrium of the lever, centres of oscillation, percussion, &c.

PLATE LXV. Fig. 7.

If the three points do not lie in a straight line, they will be in equilibrio only when the distances expressing the sides of the triangle correspond to limits. Let AE, EB, BA, (Fig. 7.) be distances constituting an assemblage of this kind; and let $AE=EB$: let FEOH be an ellipse passing through E, with A and B its foci. Let AN, Fig. 1., be equal to the semitransverse $DO=BE=AE$, and let DB be less than the breadth of the next arcs LN, NP, Fig. 7.; and the arcs NM, NO, Fig. 7., equal and similar. It is plain, that if the point E were moved to C, the attraction of A in CL, and repulsion of B in CM, would compose a force in CI along the tangent, which would return C to E; since BC would be as much shorter than at first as A was longer; and to these equal removals from the intersection, equal ordinates or forces will correspond.

Fig. 7.

But should the point E be brought to O, the forces of A and B will be equal and opposite, and no motion will arise, unless the point be otherwise somewhat removed from it, in which case it will recede still farther, and pass with an accelerated motion towards E or H. The points E and H, therefore, are exactly similar to the limits of cohesion in the original curve, Fig 1.; the points F and O are limits of non-cohesion. On the other hand, if the distance BC was that of a limit of non-cohesion, the less distance CB would produce an attraction CK; the greater AC, a repulsion; and the resulting force CG would make the point C pass to O. So that, in that case, F and O would be limits of cohesion, E and H of non-cohesion.

The point C, if removed a little from the periphery of the ellipse, will return towards it; for the increasing attractions when it passes without the ellipse, and the increasing repulsion when within it, will compose a force, in either case, tending towards the periphery and the limits of cohesion. This assemblage of three points may even serve to give us some idea of solidity, for if any thing should stop the motion of the point B, Fig. 7., while the point A is made to revolve round it, as from A to A'; the point E will, in like manner, pass from E to E', still preserving the original form of the triangle.—But enough of the system of three points.

Fig. 7.

Of the system of four points.

The system of four or more points would afford us a much greater variety, were we carefully to examine them. We shall only observe, that if two points be situated in the foci of an ellipse, and two others at the vertices of the conjugate axis, they will form a kind of square or rhombus; and if on the four angles of this square, there be conceived a series of points of the same kind, to any height, some idea may be got of the solid rod, in which, if the base be inclined, the whole superstructure will immediately be moved to one side. And the celerity of conversion will depend partly on the magnitude of the connecting forces: for should that be weak, the upper part of the structure will move more slowly, and the rod will be bent like a switch. And four points may be placed out of the same plane, so that they will powerfully preserve their position, even by the help of a single limit of distance sufficiently powerful: for the four points may be arranged as a triangular pyramid, which will therefore constitute a kind of particle most tenacious of its shape. Of four of these particles, disposed in another pyramid, a particle of a second order may be formed, less firm on account of the greater distance of the primary particles composing it, whence the action of external points upon it will be more unequal. In like manner, of these particles others may be formed of a higher order, still less firm; and thus at length we may arrive at those, which, being much greater, are more moveable and variable, upon which chemical operations depend, and of which the grosser bodies are composed; so that we would arrive at the same thing as Newton has proposed in his last optical query respecting his primary and elementary particles, which compose other particles of various orders.

And here we would beg leave to object to Boscovich, that since he has admitted that all the particles of matter may be formed upon the supposition only of one limit of distance, what good reason can be given for supposing, as he has done, that there are a succession of changes from attraction to repulsion, and *vice versa*, according to the change in the distance of his primary points. Surely this is to contradict one of the first rules of philosophising, and to multiply causes without necessity. Would it not have been infinitely preferable, to have proceeded at once upon that supposition, for the existence of which he appears to have brought forward such abundant proof? In so doing, his theory would have appeared abundantly more simple, and equally satisfactory. We can see no use whatever for that vague and Proteus-like law of forces which he has just been establishing, unless it be to use a favourite phrase of his own, to exhibit the *infinita fœcunditas theoriæ*. How different from, we had almost said how unsatisfactory in comparison to, the beautiful law of Newtonian gravity, by which the infinite variety of physical astronomy, the more generally it is applied, is the more completely explained! Compared to this, indeed, the theory of Boscovich is like the orbs, the deferents, and the epicycles of our forefathers, which, instead of explaining, only tended to multiply the difficulties of our progress in science. But we defer this, and some other remarks, until we have completed our account of the theory, and in the mean time return to its application to mechanics, perhaps the most valuable part of his work, and which is, in reality, little dependent upon this peculiar law of forces.

In proceeding to the consideration of masses, the first subject which offers is, the numerous and important properties of the centre of gravity. These are readily derived and demonstrated from our theory; but are of such importance, that we shall make them the subject of a separate article. (See *Centre of* GRAVITY.) In the mean time we shall only observe, that our author has demonstrated generally, that in every mass there must be some, and only one centre; he shows by what means it may be generally detervich's y of ral so-

mined; he points out and supplies the defect of proof in the common way of finding the centre of several bodies; illustrating the subject by the multiplication of numbers, and the composition of forces; and he demonstrates the celebrated theorem of Newton, that the centre of gravity is undisturbed by mutual internal forces; consequently, that the quantity of motion in the universe is preserved always the same, when computed in the same direction, and therefore that action and reaction are always equal and contrary.

ion.

From this law of the equality of action and reaction, readily flow the laws of collision, discovered at the same time by Wren, Huygens, and Wallis, as is mentioned by Newton, when treating of this very law. (*Prin.* lib. i. Cor. 4. Ax.) Boscovich derives them in this way. Suppose a soft globe or ball goes forward with a less velocity, and followed by another soft globe with a greater velocity, so that their centres be always carried in the line which joins them, and that the one at length hits the other, which is called a direct collision; this hitting, according to our author, is not done by an immediate contact, but before they come in contact, the after parts of the first and the fore parts of the last are compressed by the mutual repulsive force; and this compression goes on increasing until they come to have equal velocities, then all further access ceases, and, consequently, all further compression; and since the bodies are soft, they exert no mutual force after compression, but continue to go on with equal velocity. And since the quantity of motion will be the same in the same direction, we must, in order to find the common velocity after collision, multiply each mass into its velocity, and divide the sum of these products by the sum of the masses. If one of the globes were at rest, its velocity might be made $=0$, and, if moving in the opposite direction, it might be taken with a negative value.

From soft bodies, the transition is easy to those which are elastic. In these, after the greatest compression and change of figure, the two globes continue to act on each other, until they recover their first shape, and this action doubles the effect of the former. If the elasticity be imperfect, and the force in losing shape be to the force in recovering it in any given ratio, the effect of the former to that of the latter will also be in a given ratio, (See COLLISION); the deductions of Boscovich being no way different from those given in other elementary treatises.

Proceeding now to oblique concourse, let the two globes A and C in Fig. 8. come in a given time, by the right lines AB, CD, which measure their velocities into physical contact at B and D. By the common mode, the effect of the contact is thus explained: Join the centres by the straight line BD, to which, produced if necessary, draw the perpendiculars AF, CH; and completing the rectangles, AFBE, CHDG, each of the motions AB, CD is resolved into two, the one into AF, AE, or BE, BF, the other into CH, CG, or GD, DH. The first of these on each side remains entire; the second, FB and HD, make a direct collision. We must therefore find, by the law of direct collision, the velocities DK, DI, which, according to that law, will be different for different sorts of bodies; and we must compound these with the forces or velocities expressed by the straight lines BL, DQ lying in the same straight lines with BE and GD, and equal to them; therefore BM and DP will express the velocities and direction of the motions after collision. The resolution of motions in this way is considered as a real and actual resolution, the one of which continues unaltered, the other undergoes a change; and in the case which this figure expresses, is altogether extinguished, and then another is produced again. But the thing takes place, in fact, without any real resolution, in the following manner: The mutual force which acts upon the balls B, D, gives to them, during the whole time of the collision, the contrary velocities BN, DS, equal, in this case, to those two, of which the one is commonly supposed destroyed and the other reproduced; these forces, compounded with BO and DR, equal, and in the same direction with AB, CD, and therefore expressing the entire effect of the preceding velocities, exhibit the very same resulting velocities BM, DP. For it is evident, that LO will be equal to AE or BF, and therefore MO $=$BN, and BMNO a parallelogram. In like manner, DRPS is a parallelogram. Wherefore there is no real resolution in this case, but merely a composition of motions; namely, the former velocity persevering by the *vis inertiæ*, and that compounded with the new velocity which the forces produce that act in the collision.

Boscovich's theory of Natural Philosophy.

No real resolution of forces.

In the same manner, when a ball strikes obliquely on a plane, when a heavy body descends on an inclined plane, or is constrained to move in the arch of a circle, by being suspended by a thread, the case may be always explained without having recourse to the resolution of forces or motions, and all the phenomena shown to depend only on the composition of forces: thus the procedure of nature is always simple and uniform. And, indeed, that this is general, appears evident from the theory; since no motion can be partially obstructed, when there is no such thing as absolute contact; and that any point is freely moved in empty space, and at liberty to obey, at the same time, the velocity it had previously acquired, and the forces which arise from all the other points of matter. Accordingly Boscovich can see no necessity for introducing the principle of the *vires vivæ*, which Leibnitz and others have brought forward to explain the common doctrine of the resolution of forces, since those very instances employed to demonstrate their existence may be equally well explained without them. One instance may be given in the oblique collision of elastic bodies. Let (Fig. 9.) the triangles ADB, BHG, GML, be right angled at D, H, M, so that the sides BD, GH, LM, are each equal to half the base AB; and let BG, GL, LQ be parallel to AD, BH, GM, the ball A, with the velocity AB$=2$, hits at B the equal ball C, lying in DB produced from the oblique impact, it communicates to it the velocity CE$=1=$DB, which it loses itself, and then goes on in BG with the velocity$=\surd 3=$AD. In like manner, if it meets the ball I, it communicates to it the velocity IK$=1$, while it loses IH; and its velocity in GL is $=\surd 2$; then communicating to L the velocity OP$=1$, it goes on with the velocity

PLATE LXV. Fig. 9.

Fig. 9.

LQ=1, and which it communicates, by direct concourse, to the ball R. Wherefore, say they, with that force which it had with the velocity 2, it has communicated to four balls equal to it, forces which being each =1, make a total of 4; and since the original velocity was 2, the forces are not as the simple velocities into the masses, but as the squares of the velocities. But in the theory of Boscovich this argument has no force. The ball A does not communicate a part of its velocity AB resolved into DB, TB, to the ball C, and with it a part of its force. There acts upon the balls a new and mutual force in opposite directions, which impresses upon the one the velocity CE, and BD on the other. The velocity of the former ball, expressed by BF, equal and in the same direction with AB, is compounded with the new acquired velocity BD, and there arises the velocity BG, less than BF from the obliquity of the composition. In like manner, a new mutual force acts on the balls at G and I, L and O, Q and R, and the new velocities of the first ball GL, LQ, zero, compose the velocities GH and GN, LM and LS, LQ and QL, without either any actual resolution or translation of *vis viva*.

Continuity in reflection.

PLATE LXV. Fig. 10.

In the collision of bodies and reflected motion, it may be observed, that since, by this theory, there are no continuous globes, no continuous planes; the most part of the phenomena above mentioned take place only perceptibly, and not with a strict accuracy. The change of direction in impact is not made in one point, but by a continued curve, since the forces act at a distance, something in the way of AB and DM, Fig. 10. if the forces act only by repulsion. If there be alternate attractions and repulsions, the body will proceed by a winding course. But it is still evident, that if the forces be equal, at equal distances, the two halves ABQ and QDM are equal and similar. If the plane CO be rough, as must be the case in nature, and as we have exhibited in the Figure, this equality of forces will not take place; but if the inequalities be very small in respect of the distance, the irregularity, from this cause, will also be small; and it must be observed, that all the points within the segment RTS will be in action, which will render the inequality so much the more imperceptible.

In this manner one may observe, that light will be reflected at equal angles, from glass sufficiently polished, although the polishing matter has left some small inequalities. But from surfaces, which are sensibly rough, it must be dispersed irregularly and in all directions.

and refraction.

PLATE LXV. Fig. 11.

To apply the theory to the refraction of light, let there be two parallel surfaces AB, CD, Fig. 11, and a moveable point without them. At some distance it is not acted on by any force, but, within that, is urged by forces which, however, are always perpendicular to the plane. Let it approach either of them in the direction GE, with the velocity HE. Let this be expressed, or, as it is usually called, resolved into the two HS, and SE. After ingress, between the planes, its motion will be incurvated by these forces, in such a manner, however, as not to alter its velocity parallel to the planes; but its perpendicular velocity will be materially changed. There are three cases · 1st, The velocity ES may be extinguished somewhere in X, and then the body being reflected back by the same forces, will pass off in XIMK; and we have the same phenomena as in Fig. 10. 2d, The body may pass on to CD, with a diminished velocity as at O, where taking PN=HS, but OP less than SE, the angle DON is less than the angle GEA of incidence. 3d, If the velocity be increased, then *op* being greater than SE, the angle D*on* will be greater. And it will be easy to demonstrate, that the sine of the angle NES of incidence, is in a constant ratio to the sine of the angle of refraction PON.

We shall now consider the mutual action of three masses, being a more general application of the system of three points. Let the three masses, of which the centres of gravity are A, B, and C, act on each other, with forces directed towards the centres of gravity; and first let us consider the directions of the forces. The force of the point C, when attractive on either side, as CV, C*d*, will be C*e*; if repulsive, as CY, C*a*, it will be CZ; and the direction, in either case, will pass through the triangle, at least when produced to the opposite parts, cutting in the one case the interior angle ACB, and in the other, the one vertically opposite. With the attractive force CV towards B, and repulsive CY from A, the resulting force is CX. The opposite supposition gives C*b*, each of which keeps without the triangle, and cuts the external angle. To the first, C*e*, the attractions BP and AG correspond, and these, with the attractions AE and BN, would produce the forces AF and BO; but with the repulsions AI and BR, they would produce AH and BQ. In either case the forces lie towards the same side of the line AB, and either both enter the triangle tending towards it, or both of them go away from it, and tend in a direction opposite to that of the force C*e* in respect of AB. To the second, CZ must correspond the repulsions BT and AL, which, with the repulsions AI, BR, constitute AK, BS; but with the attractions AE, BN, they form AD and BM. Of these, the first pair, as well as the last, lie towards the same side of AB, and the directions of both, when produced backwards, enter the triangle, but with contrary directions to CZ; or they go away without the triangle in opposite directions from CZ. Thirdly, if CX be got, which would be produced by CV, CY, then BP and AL correspond to it, and, if the first be conjoined with BN, we shall have BO entering the triangle; but if with BR, then indeed BQ falls without the triangle as well as CX; but the corresponding forces AL and AI produce AK, which, at least, enters the triangle when produced back: wherefore there is, in every case, some one of the directions which passes through the triangle; and then what was said in the cases of C*e* and CZ, returns respecting the other two. We have therefore the following theorem: If three masses act on each other, with forces directed to their centres of gravity, the compound force, acting on one at least, has a direction, which, at least, when produced towards the opposite parts, will cut the internal angle of the triangle, and enter it: The remaining two both enter, or they both avoid the triangle, and always proceed towards the same parts, in respect of the line joining the centres of the masses: And, in the first case, all the three forces tend towards the interior of the triangle, lying in the internal angles; or all tend away from the triangle lying in the vertical opposite angles: But in the second case, with respect to the line joining the two masses, they tend towards the opposite parts from that towards which the force of the first mass is directed.

Another and more elegant theorem, relating to the directions, is, that the directions of all the three compound forces, if produced both ways, will pass through the same point; and if the point be within the triangle, they tend directly all to it, or all from it; but if without the triangle, two tend directly towards it, and the third from it, or the reverse.

That all three pass through one point, is thus demonstrated: In any figure, from 13 to 18, which exhibits all the different cases above mentioned, let the force of C be that which enters the triangle, and let the other two HA, QB meet in D. The force belonging to C is also directed by D. Let CV, C*d* be the composing forces, and having drawn CD, let VT be parallel to CA, meeting CD in T: if it be shown that it is equal to C*d*, the thing is proved, since, by drawing *d*T, we have *d*V a parallelogram. Its equality will be seen by considering the ratio of CV to C*d*, as compounded of the five ratios CV : BP, BP : PQ; PQ, or BR : AI; AI or HC : C*d*. The first, by calling A, B, C masses, of which these are the centres of gravity, is, from the equality of action and reaction, the ratio B : C. The second sin. PQB or ABD, to sin. PBQ or CBD; the third A : B; the fourth sine HAC or CAD, to sine GHA or BAD; the fifth C : A. The three ratios of the masses compose the ratio B×A×C : B×C×A, a ratio of equality. There remains the ratio sin. ABD × sin. ACD, to sin. CBD × sin. BAD. For sin. ABD and sin. BAD, put AD and BD proportional to them; and for sin. CAD and sin. CBD, put $\frac{\text{sin. ACD}\times\text{CD}}{\text{AD}}$ and $\frac{\text{sin. BCD}\times\text{CD}}{\text{BD}}$ equal to these by trigonometry; and we have the ratio sin. ACD × CD : sin. BCD × CD, that is, sin. ACD or CTV (equal to it sine VI, CA are parallel,) to sin. BCD or VCT, or which is the same, the ratio of CV : VT. Therefore CV : C*d* :: CV : VT, or C*d*=VT; and therefore CVTD a parallelogram. Q. E. D.

Cor. Should two of the forces be parallel, the third must also be parallel, and the middle one has the opposite direction of the other two.

Cor. If the directions of two forces be given, the third may be found, being drawn through their point of concourse.

Let us next compare the magnitudes of the forces —there immediately occurs this theorem: The accelerating forces of any two masses are, in the ratio, compounded of the direct ratio of the sines of the angles, which the line, joining their centres, makes with the lines joining the same centres with the centre of the third,—the inverse ratio of the sines of the angles, which the directions of the forces make with the same lines joining them to the third,—and the inverse ratio of the masses.

For BQ is to AH as BQ : BR, and BR : AI and AI : AH. The first ratio is that of the sines QRB, or CBA, to the sine BQR, or PBQ, or CBD; the second as A : B; the third sin. IHA, or HAG, or CAD, to the sin. HIA, or CAB: these ratios, changing the order of antecedents and consequents, are the ratios of sin. CBA : sin CAB, which is the first direct ratio; sin. CAD : sin. CBD, which is the second or inverse ratio, and of the mass A to B, which is the third and inverse ratio. The demonstration is the same, if BQ or AH be compared; and in this demonstration the angles, or their supplements, having the same sines, may be taken indiscriminately.

Boscovich's theory of Natural Philosophy.

Plate LXV. Fig. 13-18.

From this proposition, a number of elegant corollaries are derived; but as they cannot easily be abridged, we refer our learned readers to the work of the author. We shall only observe, that the properties of the lever, and of the equilibrium of forces acting in the same plane, are derived with facility, independent of the usual, but unphilosophical, supposition of inflexible connecting lines, destitute of all force but cohesion. With equal ease, he derives the properties of the centres of oscillation, conversion, and percussion. But ere we take leave of this part of the subject, we cannot refrain from offering to the attention of the reader, the solution of the following problem, respecting the equilibrium of two masses connected by two other points, since all that relates to momentum and equilibrium in the lever is comprehended in it.

Equilibrium.

Plate LXV. Fig. 19.

Let there be any number of points of matter in A, which call A, and any number in D, which call D. Let all these points be solicited in the directions AZ, DX, parallel to the given straight line CF, however different may be the forces. Let there be in C and B two points, which mutually act on each other, and on the points situated in A, B, and by these actions, hinder all action of the forces in A and B, and all motion of the point B; the motion of C being prevented by the contrary action of some fulcrum upon which it acts, according to the direction compounded of all the forces it has. Required the ratio of the sum of the forces at A and D must have to this, that the equilibrium may exist, and likewise the magnitude and direction of the force exerted on the fulcrum at C.

Let AZ, DX express the parallel forces of all the points in A and D. That these may be opposed, there should be equal and contrary forces at these points, viz. AG, and DK. These must arise from the actions of the points C and B, according to the right lines AC and AB on A, and on D according to DC and DB. Having drawn GI, GH parallel to BA, AC, it is plain that the force AG must be composed of AI and AH, of which the first repels any point in A from C, and the second attracts it to B. On account therefore of the equality of action and reaction, the point C will be repelled from A, and B will be attracted: in like manner C will be repelled from D, and B attracted. The point C therefore has two forces, one in the direction AC, and equal to IA drawn into A; the other equal to DM into D, and in the direction CD: in like manner, B is affected by the two attractions HA × A, and LD × D. The force resulting at B ought to be equal, and opposite to the resulting force at C. It has therefore the direction BC, when the point C is within the angle ABC, and the reverse when without it: and to produce the equivalent reaction in CB, we must give

Boscovich's theory of Natural Philosophy.

C the two opposite forces, equal also to $HA \times A$ and $LD \times D$. Wherefore

The point of A has two forces, AI, AH.
The point of D has two forces, DM, DL.
The point of B has two forces, $A \times AH$, $D \times LD$.
And C four, $A \times IA$, $D \times MD$, $A \times HA$, $D \times LD$.

Now let the line BC express the magnitude of the force compounded of CN and CR parallel to DB, AB. BN and BR will express the magnitude of these forces as well as their directions, and therefore RC, NC, equal and parallel to them, will express the third and fourth forces of the point C. Produce AC and DC till they meet, in T and O, the lines RT, NO drawn parallel to VF, GZ, or KX, and drop the perpendiculars AF, DE, RS, NQ.

Since IAG, CTR are similar, having their sides parallel, and also CON and MDK, therefore as IG or AH, to CR or BN or $A \times AH$, (that is to say, as 1 is to A,) so is AG to TR, and AI to TC. TR is therefore equal to GA, (or AZ,) drawn into A, and $CT = IA \times A$. The former consequently expresses the sum of the forces AZ of all the points of A; the latter the first part of the force of the point C, viz. $A \times IA$. For the same reason, NO will express the sum of all the forces DX of all the points in D, and OC the second force of the point C, viz. $D \times DM$. Wherefore

The sum of the parallel forces in $A = TR$.
The sum of the parallel forces in $D = NO$.
The two forces in $B = BN, BR$.
The four forces in $C = CT, OC, RC, NC$.

Now it is obvious, that the first CT and third RC compose the force $RT =$ the sum of parallel forces in A, and that OC and NC compose NO the sum of the like forces in D. Wherefore it is also evident, that the fulcrum C is urged by the point C alone, with a force which has the same direction as the parallel forces in A and D, and is equal to their sum; that is, it is urged in the same manner as if all the points in A and D were in the point C alone, and acting with these forces immediately on the fulcrum.

Besides, from the same parallelism of the sides we have the following triangles similar, viz. CNO and DPC; CNQ and PDE; CPR and VCN; CRS and VNQ; CVA and TCR; VAF and CRS.

These exhibit the following proportions:

$$ON : CP :: NC : PD :: NQ : DE.$$
$$CP : CV :: CR : NV :: RS : NQ.$$
$$CV : RT :: VA : RC :: AF : RS.$$

In which, comparing the first column with the last, we have by perturbate equality $ON : RT :: AF : DE$. That is, the sum of all the parallel forces in D, to which ON is equal, is to the sum of all the forces in $A = TR$, as the perpendicular distance AF (from the latter point to the line which passes through the fulcrum parallel to the direction of the forces) to the perpendicular distance DE from the former point to the same line. Wherefore the ratios required are now found; and we have a demonstration of the fundamental property of the lever in the commonly supposed desperate case of parallel forces.

We shall only take notice, in this place, of the mode in which the theory is applied to the pressure and velocity of fluids. Let the points lying (Fig. 20.) in any straight line AB, tend in that direction by any external force the action of which these points destroy by their mutual forces, so that they are in equilibrio. Between the first point A, and the second next it, there must be a repulsive force equal to the external force acting on A. The second point will therefore be urged by this repulsive force, as well as by its own tendency. The repulsive force between the second and third must be equal to this, and so on, increasing towards B, which will be urged forward by the sum of all the external forces of the points before it.

But if the points are not in one straight line, but dispersed throughout a parallelopiped, Fig. 21. whereof FH is the base perpendicular to, and EFHG a section parallel to the direction of the external force, it may be shown by the composition of forces, but it is sufficiently evident, that the repulsive forces with which the base acts on the particles next it, is in this case also equal to the sum of all the external forces, and this either in solids or fluids. But since the parts of a fluid are free to move in any direction, the reason of which we shall see hereafter, each particle will be pressed in every direction with the same force; so that in any plane IL, the forces are every way equal, and any particle N in LM will be urged towards FH as towards EG; and hence we see at once the reason why the base FH receives the same pressure from the fluid FLMACKIH, as from the whole FEGH; and the superficies LM receives a pressure upwards from the particles N, equal to what it would receive in the opposite direction from the mass LEAM. In this way, therefore, the hydrostatic paradox, bellows, &c. admit of explanation. If to increase the repulsive force considerably, much change of distance be requisite, the compression of the mass will be sensible, and likewise the increase of density among the lower particles; such is the case with air. If the repulsive force be powerful at small changes of distance, the mass will appear as if incompressible; which is the case with water, mercury, &c.

When a free exit is allowed to the particles of a mass of this kind, by means of an orifice, they will escape with velocities corresponding to the forces by which they are impelled. The first particle will begin to move by the repulsive force with which it is pressed by the neighbouring particles; then the second, being more distant from it than from the third, will also move away with a force corresponding to the difference between the repulsions, and therefore more slowly: the particles, therefore, will separate by the first being accelerated, until at length the repulsive force ceases, or an attraction begins, so that there will be some oscillation; but this only during a very short space of time. The velocities will depend on the area of a curve, the axis of which expresses the space passed over from the beginning of the motion. We know, that in the efflux of water the velocities are as the square roots of the heights, or compressing forces. This may be expressed by the logistic curve, as well as by many others. Whether the same absolute velocity takes place in all fluids, is matter of experiment. But we shall now proceed to the application to physics; what has been already said respecting mechanics, being a specimen of the boundless fertility of the field before us.

Application of the Theory to Physics.

In treating of the application of the theory to mechanics, we have noticed many things connected with the department on which we are about to enter. But, in order to proceed with more regularity, we shall return, in this place, to the general properties of bodies, and, in afterwards proceeding to those particular properties by which the variety of nature is explained, content ourselves with the deduction of the common principles on which their respective properties depend.

The impenetrability of bodies flows naturally from the theory of repulsive forces acting in the smallest distances, the mutual compenetration of the points being thereby prevented. Besides, as the least part of space is infinitely divisible, whilst the number of points of matter in any body is finite, it is infinitely improbable that any two points should ever meet; seeing there can be an infinite number of lines for them to move in, besides that which joins them. If, indeed, there were no repulsive forces, every mass would pass freely through every other, as light through glass, &c. and yet without any real compenetration; but the forces extending to some distance, hinder this free passage. Now, the curve of forces may have no asymptotic arch, except the first DE, in Fig. 1. of which the asymptote is in the beginning of the abscisses. Or it may have several such arcs. In this second case, if there be any asymptote at a distance from the beginning of abscisses, which has a repulsive arc without it, and an attractive arc within, then the points placed at a nearer distance cannot pass outwards, nor those at a greater distance come nearer. And in this way we may conceive a particle, a sheet, or a wall, composed of such points which would be altogether impenetrable by any external force. But in the first case, where there is no asymptotic arc except the first, it is plain, that if a velocity sufficiently great be given to any mass, it may pass through any other without any derangement of parts. For a certain time is requisite, in order that the forces, by their action, may produce any the smallest motion; and we may suppose this time by the swiftness of the motion to be diminished without limit. Thus, an iron ball may pass swiftly near several strong magnets, without being sensibly attracted by them, although its passage might be altogether prevented if it should move more slowly. Should the motion of the ball be not so great, it may derange some of the nearest magnets, and even carry them away with it, although the others at a greater distance be not sensibly affected. Thus, a ball from a gun passes through a plank of wood without deranging any part but that which lies before it, though it would break all the neighbouring parts if its motion were slower. And it is probably the vast *velocity* of *light* which carries it through pellucid homogeneous space without any compenetration or derangement of its rectilineal motion.

Extension.

From impenetrability arises physical extension: For, since the points of matter cannot occupy the same place, they must necessarily be posited without each other; and since they cannot be in absolute contact, they must be separated by some space, however small, not all in one line or plane, but diffused in space, extended in length, breadth, and depth, although so near each other that the interval escapes our senses.

Figure.

From extension arises figurability, since the space throughout which the points are dispersed has its limits, upon which its figure depends. The figure, however, of those bodies which fall under our notice can never be accurately defined, on account of the inequalities of all surfaces; but we take, in a vague and indistinct way, that figure which seems to approach nearest to the true form. Thus, we say the world is a globe, or a flattened spheroid, although the roughness of its surface makes it very different indeed from either the one or the other. From figure arises bulk, which is nothing more than the whole space in length, breadth, and thickness, which is inclosed within the external surface, and therefore our idea of it must be equally vague with that of the figure. The mass of a body is the whole quantity of matter, or, according to Boscovich, the number of points belonging to it. Our ideas of mass are yet more vague and indeterminate than those of bulk or figure; for it is not clear what must be excluded when we take only the matter belonging to a body. For all bodies are composed of very heterogeneous parts, as is evident from ocular inspection, as well as chemical analysis. Some exclude from the mass of bodies that very fine ether, much rarer than air, which they suppose interspersed throughout space; and even the air which occupies the pores of most bodies, is considered as forming no part of them. The water and air are no part of the spunge; but who considers the blood and juices as forming no part of the animal, or the sap as no part of the living tree: And air has been shown to exist fixed in many bodies, and essentially contributing to their constitution and properties. It is evident, therefore, that our notion of the mass of a body is, as yet, but arbitrary and rude.

Bulk.

Mass.

Density.

Density, is the relation of the bulk to the mass, and is greater when the mass is greater in the same bulk. Hence the measure of density is the mass divided by the bulk. But this theory differs from the common opinion, as we have already seen, in supposing that there can be no limit to the density of bodies, since the points of matter may approach to each other indefinitely near, or may be removed to an indefinite distance.

Inertia.

The inertia of bodies arises from the inertia of the points, and their mutual forces: For having demonstrated, that the centre of gravity of any system is either at rest, or moves uniformly in a straight line, undisturbed by the mutual action of the points composing the system; it is plain, that the same thing must take place in all bodies; and the *vis inertiæ* consists in nothing else being the determination of continuing in the same state of rest, or uniform motion.

Mobility.

Mobility is a consequence of the curve of forces, which, expressing by its ordinates the determinations to access or recess, necessarily implies mobility, or the possibility of motion. Some have mentioned quiescibility, or the capability of being at rest, as a property of matter. Boscovich thinks it does not exist in nature, at least as at present constituted; and he endeavours to demonstrate the truth of this sentiment, by arguments drawn from the nature of infinities, and the law of continuity. He proceeds next to the consideration of the law of equal action and reaction, which had been already proved in the second part.

Componibility equivalent to divisibility.

Divisibility is assumed by many as a property of matter, and, with respect to continued space, infinite divisibility is undeniable; but, when we consider matter as made up of a finite number of points, the divisibility has evidently a limit; for, if we suppose it carried so far as that the intervals are less than the distance between the points of matter, subsequent sections will divide not matter but empty space. But although there be no divisibility *in infinitum*, according to our author, yet there is what he calls componibility, which answers the same purpose: That is to say, between any two points of matter there may be interposed a third, another between this new one and each of the first; and so on without limit. So that, within a given space, however small, there may be such a number of points as if distributed throughout a greater space, may leave no cubic space so small as to be altogether free of matter.

Gravity.

Universal gravity, at all sensible distances, is also a part of our theory; and perhaps the curve of forces, after extending to the utmost limits of our planetary and cometary system, may intersect the axis, and pass to repulsion. This would obviate the objection made to the Newtonian doctrine of attraction, that the planets, stars, and all matter, must be thereby at length condensed into one mass. If such a repulsion takes place, the curve may even wind again about the axis, and form limits of cohesion. And in this way it is possible that our sun, with all the fixed stars, may form a particle of an order superior to those which compose our system, and belonging to a system vastly greater.

Cohesion.

From gravitation we proceed to cohesion, which has never been so well explained as by the theory of Boscovich. It arises immediately from the limits of cohesion, of which we have already treated in the first part of that article, and, therefore, we need not here enlarge upon it.

Variety of particles accounts for

We proceed now to the particular properties of bodies, by which the infinite variety of nature is accounted for. And here the variety offered to us by the theory is indeed immense: For, in the first place, there may be different numbers of points constituting particles of the same bulk; then the bulks may vary so, that no two particles have the same bulk, mass, or density; or, these being the same, the figure may be infinitely varied; and the points may be altogether placed towards the exterior surface, or dispersed throughout the mass; or of different densities in different parts of the particle. And great as may be the variety in the number and distribution of the points, the variety in the mutual forces of the particle is still more unlimited.

Fluidi and

The parts of fluid bodies are easily separated from, and moved among, one another. This seems owing to their being spherical and homogeneous. Their forces are in a great measure directed to their centres. They are therefore at liberty to be moved round each other, and will yield in any direction to a very small force. Between the particles of some there is very little, if any attraction, as in sand, dry powders, and seeds, which approach much to fluidity; others have a sensible attraction, as water, or, more perceptibly, mercury, and the like, since they form themselves into drops; in a third sort, as air, there is a powerful repulsion, and, unless confined, they will dilate themselves to a great extent; the particles must therefore be not in limits of cohesion, but in a repulsive arc of the curve expressing their forces.

Solidi

When the figure of the particles recedes much from being spherical, or the distribution of the points is unequal, the free circular motion cannot take place, and the consequent lateral forces will produce all the phenomena of solidity. Thus, if two parallelopipeds be situated beside each other, and in some limit of cohesion, the one cannot move away without bringing the other with it by the increasing attraction, or move towards the other, without pushing it before it by the increasing repulsion. And if it be any way inclined, the other parallelopiped will be attracted on one side, and repelled on the other, and of course will follow the inclination of the first. A continued series of parallelopipeds will form a long fibre, or a solid rod, of which if the base or end be inclined, the whole will follow. The same is true of all other figures, however unequal.

Hard flexibl elastic &c.

If the limits in which the particles are situated be powerful, the bodies will appear hard and inflexible; but soft and flexible, if these limits be weaker. If the arches of attraction and repulsion do not extend far on either side, the particles may come in flexure to new limits, and remain without any effort to recover their shape, as lead, and other ductile bodies. If the arches be very small, and if after that no action or a repulsion take place, the body is fragile, or brittle. If the arches are longer, the same force will continue to act, and bring back the body to its former position; nay, in consequence of the accelerated motion, the parts will pass their former positions, and vibrate backwards and forwards, by which means we account for elasticity.

Viscou

Viscous bodies occupy the mean between solids and fluids; having less cohesion than the one, and more than the other. Besides their mutual tenacity, they have a force of attraction, whereby they stick to other bodies, and moisten them. This humidity is relative. Water will stick to some bodies, and is expelled by others.

Orga tion.

The composition of crystallized and organic bodies appears very wonderful. But if we consider that particles may be so formed as in certain parts of their surfaces to attract certain other particles, in others to repel them, it is easy to conceive how they may only coalesce in certain peculiar figures; and in this way secretion, nutrition, and vegetation, may be equally explained.

nce ls.

The resistance of fluids to bodies in motion arises partly from the motion impressed on the particles of the fluid, since, according to the laws of collision, the body impressing a motion on another will lose some of its own. It also arises partly from the forces exerted by the particles against those which obstruct their motion. To define accurately the laws of resistance, is a matter by no means easy. We should know the law of forces, the number and disposition of the particles. And after all the problem would be too complicated for our analytical skill. But it may be generally observed, that, in so far as it arises from the inertia of the fluid itself, the resistance is as the density and square of the velocity jointly. As the density, because with an equal velocity, the resistance will be as the number of particles moved. As the square of the velocity, because the number of particles moved will be as the velocity, and the motion impressed on each will be also as the velocity. The resistance arising from the mutual forces of the particles, will be constant, or as the times only, if these forces be equal in all the particles; but as a greater velocity will produce a greater compression among the particles, and of course produce greater mutual forces, the resistance, therefore, is partly constant, and partly also in some ratio of the velocity. And with this, experiments appear pretty well to agree.

cal ne-

The principles of chemical operations are all deducible from the same source, namely from the variety of the particles. Were they subjected to the observation of our senses, there might, without doubt, be a general reason given from the theory, for every chemical operation. But for this would be required an intimate knowledge of the texture of every particle, and its disposition in the general mass; and a skill in geometry and analysis, which far exceeds the powers of the human mind.

Some of these phenomena may be explained as follows. The particles of some solids have a less attraction for each other, than for those of some fluids. Hence these particles are separated, and surrounded on all sides by the fluid. The mixture is therefore composed of globules, and retains its fluidity. In this way we may have an idea of *solution*. But as the attractive force will cease at a little greater distance, the solid particles will only be covered to a certain depth; and the fluid is then said to be *saturated*. If another substance, whose particles are more attracted by those of the fluid, be introduced into the mixture, the particles which had been conglomerated round the former, will be drawn away and accumulated round those of the latter, which will be dissolved in their turn; while the former by its natural gravity, falls down in a fine powder. This is called *precipitation*; and perhaps rain is a precipitation of this kind, when the aqueous particles are abandoned by the air. The combination of two fluids frequently forms a solid; and it is often observed that the specific gravity of the compound is greater than the mean, or its mass less than the sum of the component substances. This may be explained by supposing that the particles, in the first case, come into limits of cohesion; and that in the other, by being attracted more strongly, they come into smaller distances. When a solid is combined with a solid, it is necessary to dissolve, or reduce one of them to powder, so that their small particles may approach to and join each other. This is principally done by fire, which, by its vehement agitation, and the intestine motion of its particles, may account for the phenomena of fusion, liquefaction, and volatilization. By this violent agitation, our author proceeds to account for several other of the phenomena of chemistry, such as fermentation, effervescence, and the like. But the reader acquainted with modern chemistry will put little value on such explanations as this. The facts at that time known were too few, or too imperfectly described, to enable him to found a permanent theory. And we have since seen many others fail in perfecting the same structure, who had more numerous materials than Boscovich.

Fire.

Fire he conceives to be a sort of fermentation, which chiefly, if not solely, takes place in sulphureous matter, when it meets with the matter of light in sufficient abundance. This agitation separates the parts of other bodies, and brings their particles into new spheres of action, by which a small spark may speedily propagate the motion throughout a great mass; as the foot of a small bird, alighting on the top of a precipice, may move the sand, and that the gravel and stones below it, until at length great rocks, towards the bottom, tumbling into the sea, may produce a wide and lasting agitation. In the same manner, if the limits of cohesion of any body, be succeeded by a powerful repulsive arc, the small motion produced by a foreign body, may make some or all of the points pass the limits of cohesion, and be repelled from each other with great force and velocity; so that a volatilization may take place—a deflagration, or sudden explosion.

Light.

Light may be a sort of very fine fluid, or a kind of vapour, thrown off by vehement fiery fermentation. Its celerity may be accounted for, by supposing the repulsive arcs sufficiently powerful: its rectilineal propagation, by its great velocity, which affords little time for the forces of the points to produce any sensible effect; and also by the equality of actions on all sides, in a medium which is homogeneous. This homogeneity accounts for the free passage through pellucid bodies; whereas opacity will arise from the unequal texture of heterogeneous particles, producing unequal forces, which, acting on the light in various directions, inflect it in various ways; and, if the substance be somewhat thick, totally prevent its passage. The other phenomena of light may be explained in equal conformity with the principles of the theory, as is done by our author, with great acuteness and ingenuity.

Bodily sensations.

He next proceeds to our bodily sensations of taste, sound, smell, and feeling. He explains these much in the usual way, excepting, that for the immediate contact of bodies, or of the particles emitted, he substitutes the attractions and repulsions, or oscillations of the particles; which, indeed, are particularly well fitted for causing that motion in our nerves, which the disciples of Hartley have supposed to take place in the organs of sensation. But, indeed, we do not see how any attempt to account for these should have been introduced into his theory.

Electricity and Magnetism.

In explaining the phenomena of electricity, he adopts the theory of Franklin respecting a peculiar fluid, which, by it transference and constipation, produces the attractions, repulsions, sparks, &c. and even lightning and thunder.

As to the phenomena of magnetism, they may be all reduced to the attractions of certain substances for each other. Perhaps they also may be owing to the intervention of some peculiar effluvium; but, in either case, they are sufficiently reconcileable with the principles of the theory.

The theory reconcileable with other systems.

Finally, it may be observed, that although the first elements of matter are said to be indivisible, inextended, endued with the *vis inertiæ*, and the mutual forces expressible by the curve, so often alluded to; yet whether this law be intrinsic and essential to those elements; whether it be something added to them, as the substantial and accidental forms of the Peripatetics; or whether it be the free law of the Author of Nature, chosen at will for the direction of these motions, as may be more agreeable to the Cartesian; we do not here enquire, nor, in truth, can it be learned from the phenomena which opinion is the most correct. The theory may be employed in any of these modes of philosophising, and fitted to the peculiar turn of thinking in each.

We intended to have concluded this article with a few general observations on the theory of Boscovich; but as we shall have occasion to resume the subject under the head of CORPUSCULAR PHILOSOPHY, these observations may be introduced with equal propriety, and with more effect, in that part of our work. (A. N.)

Bosjesmans.

BOSJESMANS, or BOSHIES-MEN, the name of a savage people who inhabit an extensive district in the colony of the Cape of Good Hope. They are called Bosjesmans, or men of the thicket, from their lurking among the bushes, in order to shoot travellers with their poisoned arrows. The Dutch colonists, who often suffer from the rapacity of this people, treat them with the severest retaliation. They fire at them as if they were wild beasts; and Mr Barrow heard one of the colonists boast, that he had shot with his own hands nearly 300 Bosjesmans. Those who are taken alive, in any of their predatory excursions, remain during life in a state of servitude.

While the Bosjesmans are engaged in their plundering expeditions, their haunts are in the kloofs or chasms excavated by torrents of water, that wash down the steep sides of the high stratified mountains. A succession of caverns is thus formed, the highest of which is chosen by the Bosjesmans, as the most difficult to surprise. In one of their retreats, which was visited by Mr Barrow, he observed drawings of several animals, executed with great force and spirit, upon the smooth sides of the caverns. The materials which were used were charcoal, pipe clay, and different kinds of ochres. A black substance, resembling pitch, or rather Spanish liquorice, formed a thick coating upon the upper surface of the cavern. It had a bituminous smell, flamed weakly in the candle, gave out a thin brownish fluid, and left a black coally residuum about two-thirds of the original bulk. It is said to be deadly poison, and to be used by the Hottentots for poisoning their arrows. The Bosjesmans live together in small hordes or kraals, consisting of a number of separate huts, each of which is made of a small grass mat, bent into a semicircular form, and fixed down between two sticks. These huts are only about three feet high, and four feet wide, and are open before, and closed behind with a second mat. The mould within the hut is excavated like an ostrich's nest; and a little grass strewed in this simple hollow, serves for the bed in which the Bosjesmans lie coiled round like some of the lower animals. In one of the kraals which Mr Barrow saw, there were 25 huts, and about 150 inhabitants.

Bigamy seems to prevail among the Bosjesmans. The elderly men have two wives, one that is young, and another that is past childbearing; and no degree of consanguinity prevents a marriage, unless in the case of brothers and sisters, and parents and children.

The men go completely naked, and the women have only a small belt of springbok's skin, having the fore part cut into loose threads, which, though perhaps intended for a covering, did not answer the purpose. The men had pieces of wood, or a porcupine's quill, suspended to the cartilage of the nose; and some of the women had caps like helmets, made of ass skins, and shells, beads, or bits of copper, hanging on their necks from their curling tufts of hair. In person, the Bosjesmans are extremely diminutive. The tallest of the men was only 4 feet 9 inches high, while the tallest woman measured only 4 feet 4 inches. Though they have a general resemblance to the Hottentots, yet they are greatly inferior to them in personal appearance, and seem to be the ugliest of all the savage tribes. Their high cheek bones, flat nose, prominent chin, concave visage, and sharp rolling eyes, resemble those of the ape tribe; and the upper eyelid is so rounded into the lower on the nasal side of the eye, that it does not form an angle. The protuberance of their bellies, the projection and size of their posteriors, and the great curvature of their spine, though characteristic, in some degree, of the whole Hottentot race, belong, in a still greater degree, to the Bosjesmans. "If the letter S," says Mr Barrow, "be considered as one expression of the line of beauty, to which degrees of approximation are admissible, the Bosjesman women are entitled to the first rank in point of form. A section of the body, from the breast to the knee, forms really the shape of the above letter. The projection of the posterior part of the body in one subject, measured five inches and a half from a line touching the spine. This protuberance consisted of fat, and when the women walked, had the most ridiculous appearance imagi-able, every step being accompanied with a quivering and tremulous motion, as if two masses of jelly were attached behind." It is a woman of exactly this description, that has been for some time exhibiting in London under the name of the *African* or *Hottentot Venus*.

But though the general figure of the Bosjesmans is remarkably distorted, yet their limbs are well turned and proportioned, and their activity is truly astonishing. They leap from rock to rock with the velocity of the antelope, and horsemen cannot overtake them on rough ground, or along the sides of mountains. In order to give them additional speed, they push the testicles to the upper part of the root of the penis, where they remain as firmly and securely as if it had been their natural position.

The Bosjesman women possess another peculiarity of a very singular nature. The nymphæ are in all of them elongated, and in some of them, examined by Mr Barrow, the elongation exceeds five inches, though in others is said to be much longer. These projecting labia collapse and hang down, and appear, at first sight, to be a masculine organ. Their colour is livid blue inclining to red, not unlike the excrescence on the beak of a turkey. This deformity is said by some travellers to be produced artificially, by suspending pieces of stone from the internal labia; but there are numerous instances of its being possessed by Bosjesman women, who have been taken from their mothers when infants, and brought up with the Dutch farmers. This elongation of the nymphæ is found in all Hottentots, seldom exceeding three inches, and appearing only like a projecting orifice, or elliptical tube an inch long. In the children of a European and a Hottentot this deformity ceases to appear.

Though the Bosjesmans are completely Hottentots, yet, in the bent and energy of their minds, they differ widely from those who live in the colony. Lively, cheerful, and active, they hate to be idle, and are always employed in some active occupation or amusement. During the day they are generally confined to their huts, lest they should be surprised by the Dutch colonists; and they often dance by moon-light from the setting to the rising of the sun. They hail the approach of the first thunder-storm, at the end of winter, as the harbinger of summer, and, animated with joy, they tear in pieces their skin coverings, and dance for several nights in succession.

There are few savage tribes whose physical condition is more unfavourable to this natural cheerfulness of mind, than that of the Bosjesmans. They neither breed cattle, nor cultivate the ground, and they have few vegetable productions that can be used as food. The bulbs of the iris, and a few gramineous roots of a bitter taste, which are found by scratching the surface of the plains, are the only vegetables which they can obtain. The larvæ of ants, and those of locusts, are the animal productions on which they subsist. They exhibit great ingenuity in taking them, but all their dexterity is often insufficient to ensure success.

At some particular seasons, these precarious sources of subsistence completely fail them, and they are compelled, by the strongest principle of their nature, to undertake a hazardous expedition into the colony for plunder; and in these excursions they exhibit a ferocity of character which does not naturally belong to them, but which has been created and inflamed by the barbarous treatment which they have received from the Dutch. "Should they seize a Hottentot," says Mr Barrow, "guarding his master's cattle, not contented with putting him to immediate death, they torture him by every means of cruelty that their invention can frame; as drawing out his bowels, tearing off his nails, scalping, and other acts equally savage. Even the poor animals they steal are treated in a most barbarous and unfeeling manner: driven up the steep sides of mountains, they remain there without any food or water till they are either killed for use, or drop for want of the means of supporting nature.

When a horde is surrounded by the farmers, and little chance is perceived by them of effecting an escape, they will fight it out most furiously so long as a man shall be left alive. It frequently happens on such occasions, that a party will volunteer the forlorn hope, by throwing themselves in the midst of the colonists, in order to create confusion, and to give to their countrymen, concealed among the rocks or in the long grass, at the expence of their own lives, an opportunity of exercising more effectually their mortal weapons upon their enemies, and at the same time to facilitate the escape of their wives and children.

Their plundering expeditions are conducted not without system. If in carrying off their booty they should chance to be pursued, they always divide; one party to drive away the cattle, while the other continues to harass the pursuers; and when the peasantry prove too many for them, they stab and maim, with poisoned weapons, the whole herd. On all such plundering expeditions, they carry, in addition to their bows and arrows, lances that resemble the Kaffer's *hassagai*, but of a much smaller size, and always dipt in poison. Their bows are remarkably small; and, in the hands of any one but of a Bosjesman, would be entirely useless. From their earliest infancy they accustom themselves to the use of the bow: all the little boys who came to us at the Kraal, carried their bows and small quivers of arrows. A complete quiver contains about 70 or 80, made like those of the Hottentots; and, in addition to these, a few small brushes to lay on the poison; pieces of iron, red ochre, leg bones of ostriches cut in lengths and rounded, and two little sticks of hard wood to produce fire: This is done by placing one horizontally on a piece of withered grass, and whirling the other vertically between the hands, with the point acting in a hollow place, made in the surface of the former. In a few seconds of time, the velocity and friction set the grass in a blaze."

When the Bosjesmans succeed in capturing a herd of cattle, they are slain in such numbers, that vultures are attracted by the putrefying mass which surrounds their kraals; and these birds of prey are thus frequently the means of pointing out to the colonists the haunts of the plunderers.

The Bosjesmans have a singular remedy for diseases of every kind. From the belief that the disease is carried off by the effusion of blood, they take off the extreme joints of the fingers, commencing with the little finger of the left hand, as the least useful. They bury their dead, and load the grave with heaps of stones.

The language of the Bosjesmans is the same as that of the Hottentots, though they differ extremely in their mode of speaking it. The Hottentots generally pronounce one syllable of every word by the action of the tongue against the roof of the mouth, or the teeth; while the Bosjesmans pronounce every syllable in the same manner, but with a more forcible utterance. See Barrow's *Account of Travels into the Interior of Southern Africa*, 4to. p. 84, 234, 275, &c.; and Sparrman's *Voyage to the Cape of Good Hope*. (Q)

BOSNIA, a province of European Turkey, derives its name from the river Bosnia, which passes through it, and falls into the Save. It is about 120 miles long, and 72 broad; and is bounded on the north by Sclavonia, from which it is separated by the Save; on the east by Servia, from which it is separated by the Drino; on the west by Croatia and Dalmatia; and on the south by Albania. Bosnia is a mountainous province. The arable land on the banks of the rivers produces good wheat; and the mountains afford excellent pasture to numerous herds of cattle, and are enriched with several silver mines. Bosnia carries on an inconsiderable commerce with Sclavonia at Brod, on the banks of the Save, where there is a chamber of health for the merchandise and the merchants that come from Turkey. The principal articles exported by the Bosnians to Brod, are, raw skins, wool, and cotton. Besides Brod, there are several small ports upon the Save where the Bosnians exchange their cattle, which they swim across the river, for the productions of Sclavonia. A fair is held at these places every week, under the superintendance of a customhouse officer. The Bosnians import also a small quantity of wine from Sclavonia. In 1802, it amounted only to 19 barrels and a half. In 1802, 168 barrels of *sliwowitza* was imported into Bosnia.

The capital of the province is Banjaluka, which is the residence of a Beglier bey. The Latin bishop of Bosnia resides at Diakevar, in Sclavonia.

The part of Bosnia which borders on the right bank of the Save, belonged to the house of Austria; but they lost it by the peace of 1739. In 1789 and 1790, they reconquered a considerable part of the province; but it was restored to the Turks in 1791, by the treaty of Sistovia.

The principal inhabitants of Bosnia are Greek Christians, and a few Mahometans, Jews, and Catholics. See Demian's *Tableau Geographique et Politique des Royaumes de Hongrie, D'Esclavonie, de Croatie*, &c. Paris, 1809, tom. ii. p. 54, 55, 56. (H)

BOSPHORUS, from βους an ox, and πορος a passage, is a name given to a streight by which two seas communicate with each other; but applied particularly to the streights of Constantinople, or the Thracian Bosphorus, which joins the sea of Marmora with the Black Sea; and also to the streights of Caffa, in the Cimmerian or Scythian Bosphorus, which joins the sea of Azof with the Black Sea. These streights are supposed to have obtained this name from their being so narrow that an ox could easily swim across them. Tournefort is of opinion, that the Thracian Bosphorus was so called from the cattle market being held near it. According to Olivier, the Thracian Bosphorus is about 21 miles long, and about 20 miles from the Cyanean isles, at its entrance into the Black Sea, to the point of the Seraglio of Constantinople. Its greatest breadth does not exceed two miles. The Cimmerian Bosphorus is about four leagues broad. See Tournefort's *Voyage au Levant*, tom. ii. lett. 12 et 14; Olivier's *Voyage*, &c.; and Dureau de Lamalle, *Geographie Physique de la Mer Noire, &c. passim.* See also, BLACK SEA. (*j*)

BOSSIÆA, a genus of plants of the class Diadelphia, and order Decandria. See BOTANY. (w)

BOSSINEY, TREVENA, or TINTAGEL, an ancient borough of Cornwall, partly situated on an isthmus, and partly on an island which was once joined to the main land by a bridge. Dr Maton describes it as a miserable groupe of about 20 cottages, though possessed of all the privileges of a chartered borough. The surrounding country is bleak and rugged. Near Bossiney are the ruins of a castle, in which King Arthur is said to have been born. See Oldfield's *History of the Boroughs*. (*j*)

BOSSUET, JACQUES BENIGNE, a celebrated French divine, was born at Dijon on the 27th of September, 1627, of a family of great respectability in the parliament of Burgundy. The talents which he displayed in the commencement of his studies, rendered the Jesuits, his first instructors, anxious to enlist him into their society; but their design was immediately perceived by an intelligent uncle, who had the charge of his education, and who, to rescue his nephew from that factious and intriguing order, sent him to Paris to finish his studies at the college of Navarre.

As his views were directed towards the clerical profession, he pursued, with the ardour and emulation of a rising genius, every study which appeared to be essential, or even remotely conducive, to his excellence as a minister of the gospel. He perused the sacred writings in particular, with a relish and fondness approaching to passion; he studied with assiduous attention, the writings of the fathers, among whom Augustine was his principal favourite; and he enriched his mind with all the treasures of classical literature. The sublime, the bold, and unconstrained effusions of the Mæonian bard, while they called forth the kindred qualities of his own mind, inspired him with a kind of affectionate reverence; he dwelt with great delight on the eloquent declamations of Cicero, and the graceful strains of Virgil; but, with a sternness that does more honour to his conscience than to his taste, he condemned the fascinating, though often licentious, verses of Horace; nor could the enchanting gaiety of the poet's fancy, and inimitable felicity of his expressions, compensate, in the rigorous judgment of Bossuet, for the lax morality of the Epicurean.

The same austerity of disposition led him to dis-approve the liberty frequently taken by Christian poets, of introducing into their verses, the names of heathen divinities, and allusions borrowed from Pagan mythology. We are not certain whether we should be as much alarmed as Bossuet, by the fancied immoral tendency of such a practice; but we have no hesitation in joining him, even against the authorities of D'Alembert and Boileau, in the condemnation of an abuse, which serves only to introduce absurdity into modern poems, without adding, in any respect, to their interest. A poet of genius cannot need the aid of these mythological fictions; and when they are interwoven into the flimsy productions of an ordinary versifier, they only attract attention to that indigence of thought, which they cannot conceal.

Mathematics was almost the only science which Bossuet disregarded; from a strange opinion, that a knowledge of mathematics was either useless to the divine, or directly hostile to the feelings which he ought to cherish, and the studies which he ought to pursue. Though averse to this study, Bossuet entered, with considerable eagerness, into the speculations of philosophy. The Cartesian system, which had been recently divulged, and which was then forcing its way against inveterate prejudices, recommended itself, by its boldness and its novelty, to his vigorous and independent mind; and he warmly patronized and defended it, against the fulminations of his ecclesiastical brethren, and the more formidable edicts of civil authority.

His talents for eloquence, to the improvement of which all his studies were directed, were admirably displayed from the pulpit, at the early age of sixteen. He had been announced as a young man of premature genius, at the Hotel de Rambouillet, to which merit of every kind was then summoned to appear. A numerous and select company met for the purpose of deciding on his qualifications as an orator, and proposed to him a subject, from which Bossuet, almost without preparation, pronounced a sermon, which drew forth the warmest applauses from his auditors. He had the merit of producing a total change in the tone of pulpit eloquence; and of substituting, for the coarse indecencies and quaint affectation by which it was degraded, the strength and dignity which become the sublime truths and elevated morality of the gospel. "One of those men," says D'Alembert, "who make a parade of believing nothing, wished to hear, or rather to brave him. Too proud to own himself overcome, but too just not to pay homage to a great man; 'There,' said he, on leaving the church, 'is the first of preachers for me; for he is the person by whom I feel that my conversion would be effected, if it were to be effected at all." Thus applauded as an orator, Bossuet became ambitious of distinguishing himself in the field of theological controversy. With this view he undertook the refutation of the catechism of Paul Ferry, a Protestant minister, with whom he had hitherto lived in intimate friendship; and it deserves to be recorded, to the immortal honour of both, that the heat of their theological contentions never betrayed them into even a momentary oblivion of their former amity. The reputation of Bossuet soon reached the court, and he was invited to Versailles, the proper theatre for the display of his brilliant talents. Amidst the splendour and seductions of a palace, he preserved a dignity and independence of conduct, becoming his character as the ambassador of Heaven. Without a single effort to force himself into notice, except by his exhibitions in the pulpit or at the altar; without once descending to the meanness of flattery or paltry intrigue, he obtained from Louis XIV. the bishopric of Condom —a just tribute to his transcendant, though unobtrusive merit.

The French Academy, desirous of appropriating to themselves part of the reputation of so celebrated a man, admitted him into their number, in 1671. About the same time, he was selected by Louis as the most proper person to be intrusted with the important charge of the Dauphin's education. That he might be enabled to devote himself entirely to this sacred charge, he resigned his bishopric, and received, in exchange, an abbacy of trifling revenue, but sufficient to satisfy his moderate desires. Aware that religion alone can furnish any restraint on the caprices of an arbitrary monarch, Bossuet made it his principal care to inspire his pupil with a habitual regard to the King of kings, whose vigilant eye observes our minutest actions; and at whose impartial tribunal sovereigns, as well as their subjects, must account for the use which they have made of the advantages with which His providence has favoured them. He composed, for the use of his royal charge, *A Discourse on Universal History*, which is certainly the most important of all his works. "In this grand sketch," we again borrow the words of D'Alembert, "we admire a genius as vast as profound, which, disdaining to dwell on frivolous details, so dear to the crowd of historians, sees and judges at one glance, legislators and conquerors, kings and nations, the crimes and virtues of men; and traces with a rapid but expressive pencil, time, which devours and engulphs every thing,—the hand of God on human grandeur; and kingdoms, which die like their masters."

When he had completed the education of the Dauphin, Louis testified his satisfaction with his talents and fidelity, by appointing him first almoner to the Dauphiness, and investing him with the bishopric of Meaux. In this new situation, he again devoted himself to the service of religion, and the defence of the church. The numerous controversies in which he became involved with infidels and Protestants, gave him an opportunity of displaying much logical acuteness and dexterity of argumentation; he is said to have brought back to the Catholic faith, several who had embraced the Protestant religion; and such was his anxiety to effect a re-union of the Protestants with the church of Rome, that he made a voluntary offer to travel, for this purpose, into foreign countries. With the same view, he established a correspondence with the celebrated Leibnitz; who, more tolerant or more indifferent than Bossuet, wished to restore unity and peace by mutual concessions. Bossuet remained inflexible, and insisted that the Protestants, as a preliminary step, should implicitly

Bossuet.

submit to every thing required by the council of Trent. In justice to his character, however, we must observe, that, though thus zealous in the cause of Popery, he never gave the slightest countenance to the persecution of the Protestants; persuaded that argument, and not the sword, is the proper instrument of conversion.

While he thus stood forth as the champion of his religion, he was no less strenuous in defending the particular rights of the French church, and the independence of the French crown, against the presumptuous claims of Pope Innocent XI. His holiness held out to him the temptation of a cardinal's hat, in order to induce him to withdraw his opposition; but Bossuet, true to his brethren and his king, refused an honour, which, without increasing his respectability in the church, could only add the sounding title of *Eminence* to his name.

The reputation of Bossuet was now at its height; and we wish, for the honour of his memory, that we could here close the list of his theological contests. Unfortunately, he thought himself obliged to oppose, with a degree of harshness and severity for which we can find no apology, the amiable and virtuous Fenelon, who entertained some notions on Quietism, which alarmed the orthodoxy of this zealous guardian of the true faith. We are afraid that something like envy may have prompted that asperity of censure which extorted from the mild Archbishop of Cambray a reluctant complaint; and whatever might be the result of their dispute, we believe there is not one of our readers who would not have resigned all the triumphs of Bossuet, for the more honourable testimony given to his rival: Bossuet, it was observed, proves religion; Fenelon makes us love it. Yet, however we may condemn the relentless vigour of his temper, it is impossible not to respect his sincerity and firmness. When Louis, astonished at the impetuosity with which he inveighed against Fenelon, asked him, "What would you have done, if I had taken part with Fenelon against you?" "Sire," replied the spirited bishop, "I would have cried twenty times louder." On another occasion, however, he shewed a more temporising disposition: for when Louis, who was passionately fond of theatrical entertainments, which Bossuet had uniformly condemned, consulted him with regard to the propriety of going to a certain play, "Sire," replied he, "there are great examples for it, and strong reasons against it."

From these scenes of bustle and contention, we accompany Bossuet, with much satisfaction, to his own diocese; where, forgetting the tumult and vanity of the world, he devoted his whole time to the instruction of the ignorant, the support of indigence, and the consolation of misfortune. "It was a rare and affecting spectacle," says his panegyrist, "to see the great Bossuet, transported from the chapel of Versailles to a village church, instructing the peasants to bear their evils with patience; assembling with tender affability, their young family around him; taking pleasure in the innocence of the children, and the simplicity of the parents; and finding in their naiveté, their movements, and affections, that precious truth which he had sought for in vain at court, and so rarely met among men." Amidst these labours of love, he tranquilly closed his life, on the 12th of April 1704, regretted by the whole Catholic church, which still reveres his memory as one of her ablest and most faithful champions. Different colleges vied with each other in the funeral orations which they pronounced in his praise; and his grave was bedewed with the unfeigned tears of the flock, whom he had guided by his example, and soothed with the affectionate care of a father.

Of the merit of Bossuet, as a preacher, it is not easy to form a fair estimate; for, as he seldom wrote more than the heads of his discourse, the sermons which he has printed must be regarded rather as bold and hasty sketches, than finished compositions. In his funeral orations he is altogether unrivalled, for elevated sentiments and affecting tenderness. The most celebrated of his funeral orations are those pronounced in honour of the Queen of England, widow of Charles I; the Duchess of Orleans, sister to Charles II.; and the celebrated Prince of Condé. (*k*).

BOSTON, formerly *Botolph's Town*, a large commercial town of England, in Lincolnshire, situated on the east side of the river Witham, about five miles from the sea. The town is well built, and has lately received very considerable improvements. Its spacious market-place is adorned with a handsome cross, and a commodious assembly room. The public buildings are the theatre, the fish market, built in 1772, and the elegant church of St Botolph's. This magnificent building was begun in 1309, and is said to be the largest parochial church, without cross aisles, in the world. Its lofty tower, which is 282 feet high, supports an octagon lantern which serves as a lighthouse to the vessels that navigate the dangerous channels of Lynn Deeps and Boston Deeps. It has 365 steps, 52 windows, and 12 pillars, corresponding to the number of days, weeks, and months, in the year, and is 300 feet long, and 100 feet wide.

Boston formerly carried on a great trade in the exportation of wool, but after this trade was prohibited, it carried on a considerable foreign and coasting trade. At spring tides, the Witham is navigable for vessels of about eleven feet of water, and the barges navigate this river as far as Lincoln. Some of the foreign vessels trade in timber, rye, wine, &c. and several ships are employed in the corn trade to London.

The fens with which this town was formerly surrounded, have been, in a great measure, enclosed and drained, and form good meadow and arable land. It is proposed to build an iron bridge over the Witham, instead of the present wooden one. Number of houses 1221. Population in 1801, 5926, of whom 866 were returned as employed in trade and manufactures. See Oldfield's *History of the Boroughs*, and Howlett's *Select Views of Lincolnshire*. (*j*)

BOSTON, called *Shaumut* by the Indians, and *Trimountain* by its first settlers, is a large town of America, the capital and port of the state of Massachusetts and of New England, and the third town in point of size in the United States. It is situated on an irregular peninsula at the bottom of Massachusetts bay, and is connected with the main land by an isthmus, at the south end of the town. The length of the town, including the rock, is three miles, and its widest part one mile and 139 yards. The town of Boston contains 79 * streets, 36 lanes, 26 alleys, and 18 courts. The principal public buildings are the State-house, the court house, two theatres, Faneuil hall, concert hall, the almshouse, the workhouse, the powder magazine, the gaol, and the bridewell; besides 19 buildings for public worship, most of which are adorned with lofty and beautiful spires. On Beacon Hill, the highest land in the peninsula, is a monument, having on its top a gilt eagle, and the arms of the union, with several inscriptions on its base, in commemoration of the leading events of the American war. On the south side of the hill, a magnificent statehouse was begun in 1795; and on the east side is the Mall, which is a delightful promenade about 600 yards long, adorned with rows of trees. The two bridges over Charles River, called Charles River Bridge, and West Boston Bridge, contribute to the ornament, as well as to the accommodation of the town. The former is 1503 feet long, and 43 feet broad, stands on 75 piles, and cost 50,000 dollars. The latter is 3483 feet long and 40 feet wide, stands on 180 piles, and cost 76,700 dollars. Besides these public buildings, there are seven free schools at Boston for the education of the citizens children.

The approach to Boston from the sea is singularly picturesque and beautiful. The town is built in an irregularly circular form round the harbour, which is studded with about 40 small islands, 15 of which afford excellent pasturage, and are frequented in summer by numerous parties of pleasure. The harbour itself, which is formed by Nahant Point on the north, and Point Alderton on the south, is so capacious, as to allow 500 vessels to ride at anchor in a tolerable depth of water. The entrance to the harbour, which is so narrow as scarcely to permit two ships to pass abreast, is defended by the fort of Castle William, erected upon Castle Island, and having 40 pieces of heavy artillery. On one of the islands, at the north entrance of the channel, is placed a lighthouse about 65 feet in height.

Prior to the late commercial decrees, which have proved so injurious to the trade of the United States, the trade of Boston was very considerable, as appears from the following statement:

	Vessels Cleared out.	Vessels Entered.
1748	500	430
1784	450	372
1794		567
1795		725

There are no fewer than 80 wharfs and quays in Boston. The long wharf, or Boston pier, stretches 1743 feet into the harbour. It is 104 feet broad, and at the extremity of it there is 17 feet of water at ebb tide.

The principal manufactures of Boston, are sail-cloth, cordage, cards for wool and cotton, playing cards, paper hangings, hats, plate, glass, tobacco, rum, loaf sugar, beer, and chocolate. There are in Boston 30 distilleries, 11 rope-walks, 8 sugar-houses, 2 breweries, and 3 banks. The principal societies are the American Academy of Arts and Sciences; the Marine Society; the Massachusetts Agricultural Society; the Massachusetts Historical Society; the Medical Society; the Humane Society; the Boston Library Society; and the Boston Mechanic Association; beside several religious and charitable institutions.

The town of Boston was settled from Charlestown in the year 1631. It received great damage from an earthquake on the 29th October 1727, and has since suffered severely from numerous fires, the houses being chiefly built of wood. In 1794, no fewer than 96 houses were consumed, and the loss sustained amounted to 209,861 dollars. Number of houses 2376. Population in 1790, 18,038; but since that time it has considerably increased. West Long. 70° 58′ 53″, North Lat. 42° 23′ 15″. See Morse's *American Geography*, p. 187. Morse's *American Gazetteer*. Wansey's *Journal*, London, 1796. A full account of the operations of Boston during the American war, and an excellent plan of the town, harbour, and environs of Boston, are to be found in Marshall's *Life of General Washington*, vol. ii. chap. iv. and vol. v. frontispiece. (π)

BOSWELL, James, a celebrated literary character, was descended from an ancient and honourable family in Scotland. He was born at Edinburgh, October 29, 1740. His father, Alexander Boswell, was one of the judges in the supreme courts of Session and Justiciary, by the title of Lord Auchinleck, a man of a strong understanding, a sound scholar, a respectable and useful country gentleman, and an able and upright judge. His mother, Euphan Erskine, descended in the line of Alva from the house of Mar, was a woman of exemplary piety. He received the first rudiments of his education partly at home under private tuition, and partly at the school of Mr Mundell in Edinburgh. In his earliest years, he displayed that quickness of mind, vivacity of disposition, and taste for literature, which accompanied him throughout his life. He afterwards studied civil law in the universities of Edinburgh and Glasgow. This latter seminary was then, as it is now, very much resorted to by students from England, with several of whom Boswell became intimate, but with none so much as with Mr Temple, afterwards Vicar of St Glurias in Cornwall, who was a friend of Gray, and whose character of that poet has been adopted both by Dr Johnson and Mr Mason. This society confirmed in him a design, which he had early formed, of visiting England, and a predilection for English manners, which he has often been heard to say, was originally derived from a perusal of the lively representations in the Spectator. His first visit to London was in the year 1760, which afforded him the highest gratification. He happened, at his first entrance into the capital, to form an acquaintance with Derrick, an author by profession, who was afterwards master of the ceremonies, or king, (as it is termed), at Bath. Derrick was a man of some literature, but had hung loose about the world for some time, and was thus admirably qualified, by his lively talents and desultory habits, to introduce a stranger into all the varieties of a London life. The circumstances of this visit Boswell used often to detail with that felicity, for which he was always remarkable in narration, and exhibited so curious a picture of the scenes he had passed through, that his friend Dr Johnson advised him to commit it to paper and preserve it. Notwithstanding he was intended, by his education, for the bar, yet he was himself, at this period, earnestly bent upon obtaining a commission in the guards, and solicited Lord Auchinleck's acquiescence; but he returned, by his desire, into Scotland, where he received a regular course of instruction in the law, and passed his trials as a civilian at Edinburgh. Though still anxious to pursue his original design, he at last relinquished it in compliance with his father's wishes, and consented to go to Utrecht in 1763, to hear the lectures of an eminent civilian, after which he had permission to make the tour of Europe. But before he quitted his native country, a circumstance took place, of no small importance to himself, and, as it afterwards appeared, of no small importance to the public. He obtained this year an introduction to Dr Johnson. He had long entertained the most enthusiastic admiration of that great man as a writer; and having learned that his powers in conversation were equal to his noblest productions, he was anxiously solicitous for his acquaintance. From hence we are to date a friendship which continued unabated to the last. Boswell, who saw every day as his knowledge of Johnson increased, fresh evidences of the strength of his intellect and the goodness of his heart, regarded this venerable moralist with almost filial reverence; while Johnson, whose sagacious intuition into character, soon led him to perceive and appreciate justly the fertile talents, and truly amiable disposition of his young acquaintance, repaid his fervent affection with the most cordial attachment. Having continued one winter at Utrecht, during which time he visited several parts of the Netherlands, he commenced his projected travels. Passing from Utrecht into Germany, he pursued his route through Switzerland to Geneva, whence he crossed the Alps into Italy, having visited in his journey Voltaire at Ferney, and Rousseau in the wilds of Neufchatel. But the most distinguished incident in his tour was, his spirited expedition into Corsica, then struggling against the tyranny of the Genoese. He adopted the feelings of those brave islanders with the most ardent enthusiasm, and commenced the most intimate friendship with their illustrious chief. He afterwards went to Paris, from whence he returned to Scotland in 1766, and soon after became an advocate at the Scotch bar. But, in the mean time, he was by no means forgetful of the interest of that gallant body of patriots whom he had left behind. He endeavoured to stimulate the statesmen of his own country to advocate their cause; and he had, on this occasion, the honour of a very interesting interview with Lord Chatham. One particular of this conversation which he has recorded, does equal honour to the liberality of the distinguished character by whom it was said, and to the great man of whom it was spoken. It may be said of Paoli, as the Cardinal de Retz said of the great Montrose, *C'est un des ces hommes qu'on ne trouve plus que dans les Vies de Plutarque.* The celebrated Douglas cause was at this time the subject of general discussion. Boswell, who had warmly adopted that opinion which was afterwards established by the decision of the first tribunal in Europe, justly thought that the great body of readers would scarcely endure the labour of extracting the real merits of the case from the voluminous mass of papers which had been printed on that question, and he therefore compressed them into a pamphlet, entitled, *The Essence of the Douglas Cause*, which had a considerable share in procuring for Mr Douglas the extensive popularity which a knowledge of his claims enabled him to obtain. In 1768, finding that the public were not a little anxious to learn the narration of him, " whom, (as Johnson expressed it,) a wise and noble curiosity had led where perhaps no native of this country ever was before," he published his *Account of Corsica, with Memoirs of General Paoli.* On the appearance of this work, he was again gratified by an encomium from Johnson's pen. " Your history is like other histories; but your journal is in a very high degree curious and delightful.****You express images which operated strongly upon yourself, and you have impressed them with great force upon your readers. I know not whether I could name any narrative by which curiosity is better excited, or better gratified." This book has been translated into the German, Dutch, Italian, and French languages; and his name by it has nearly acquired as much celebrity on the continent, as his admirable biographical work has procured for him at home.

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* Morse, in his *Gazetteer*, makes it 97 streets; but in his *American Geography*, where the number of streets is expressed in words, he makes them 79. As it is more likely that there has been a transposition in the figures, than an error in the words, we have adopted the latter.

In 1769, Mr Boswell was married to his cousin, Miss Margaret Montgomery. His union with this truly amiable and accomplished woman proved a source of felicity to him for many years; but he was doomed to suffer the affliction of losing her in June 1789. Dr Johnson had long formed the plan of visiting the Hebrides of Scotland in company with his friend, and in 1773, though at an advanced period of life, he put that plan in execution. They have both published an account of their journey. In 1782 Lord Auchinleck died, and his son succeeded to the family estate in Ayrshire. The coalition ministry having been driven from power in 1783, for an attempt which Mr Boswell was convinced would have been subversive of the constitution, he published a pamphlet on the subject, entitled, *A Letter to the People of Scotland*, which produced considerable sensation, and for which he was complimented by Mr Pitt. But he was no party man; for, in the following year, a plan having been in agitation to *reform* the court of session, by the compendious mode of cutting off one-third of the number of the judges, Mr Boswell again embarked in politics, in opposition to the very ministry whom he had zealously supported before, when he thought them in the right, and, in *A Second Letter to the People of Scotland*, he remonstrated warmly against the measure, which was afterwards withdrawn. In 1784, he met with a severe affliction in the death of his illustrious friend Dr Johnson, who died on the 13th of December of that year. Mr Boswell, during his residence in Scotland, had no inconsiderable practice at the bar, and enjoyed the intimate acquaintance of the most celebrated among his countrymen, of Lord Kaimes, Lord Hailes, Dr Robertson, Dr Blair, and Mr Beattie, besides a numerous circle of other persons, distinguished for their rank, talents, and virtues; but his love for London, and its wide and varied scene of life imbibed in his youth, and which gained strength as he grew older, determined him at last to settle with his family in the metropolis, which he did in 1786, having a short time before been called to the English bar. In 1785, he published his *Journal of a Tour to the Hebrides*, which not only forms a striking part of his delineation of Johnson, but is replete with interesting information on various topics. There has no where appeared so lively or so affecting an account of the difficulties and escape of the grandson of James II. after the battle of Culloden. From this time he was for some years most assiduously employed in preparing his great biographical work for the press. At last his *Life of Dr Johnson* appeared in 1790, in 2 vols 4to. Of this work the public expectation was high, and it was amply gratified. Never before had the world seen so full, so faithful, and so correct a representation of an eminent man. Those who had been unacquainted with Johnson were now introduced into his society, and enjoyed "the feast of reason" as much as if they had conversed with him for years. Those who had known him found their knowledge so agreeably renovated, and so enlarged, that many of them confessed, that they had a more vivid idea of Johnson's character and colloquial powers from Mr Boswell's narrative, than their own experience, even in actual intercourse with him, could have supplied. This work, however, did not escape criticism: Some objected to the minuteness of the relation, and the introduction of petty details; but it should be recollected, that circumstances which, separately taken, are of little moment, when united together go to constitute a full and lively resemblance, instead of that meagre outline which biographers in general are content to display. Others maintained, that Johnson's virtues were such, that no mention should have been made of his failings; but to this it may be observed, that the mode they recommend would have been contrary to that strict regard for truth which Johnson himself always inculcated in works of this nature; and, secondly, that this plan would have defeated it own purpose. The world was already in possession of the writings of Sir John Hawkins and Mrs Piozzi. Had Mr Boswell confined himself to the exemplification of his great friend's virtues alone, the unfair and false exaggerations of the others would have been considered as the real reverse of the picture. He did better: By a candid, unvarnished exhibition of the whole truth, he clearly proved that his faults, when compared with his excellencies, were as dust in the balance. Others there were who, unable to deny the merit of the work, attempted, with feeble effect, to tear the laurels from the brow of the author. It required no great power of mind, they observed, to record the brilliant sayings of others. Nothing can be more ignorant than this remark. There is no faculty more rare. "Few people," said a celebrated wit, "can *carry* a bon mot: It cannot then be easy to carry as many as will fill two quarto volumes." But, in fact, it is a false representation of the *Life of Johnson*, to describe it as merely a collection of good sayings. Valuable as it is in that respect, it is far from being the whole of its merit. It contains an exquisite delineation of character, conveyed throughout with dramatic vivacity, and proves the writer, as has been truly observed, to have had a picturesque imagination, and a turn for poetry as well as humour. It is remarkable that, notwithstanding his enthusiastic admiration of Johnson, he is free from all attempt at imitation, and has never transfused "the long majestic march" of the great moralist's language into his own style, which, though frequently enlivened by a happy vein of imagery, is uniformly simple and unaffected.

On the publication of this work, he was gratified with the most liberal applause by his most distinguished contemporaries. Nor were their sentiments in its favour expressed to himself alone: Mr Burke, in a conversation with Sir James Mackintosh, declared, that Boswell's Life would do more honour to Johnson than all his works put together. Such an encomium from such a man will much more than counterbalance all the witling sneers with which dulness, spleen, or malice, have assailed him. From this time till his death, we have nothing memorable to record. In 1795, he was suddenly seized with an ague. The confinement which this disorder occasioned brought on a painful complaint to which he was subject, and he died at his house in London, on the 19th of June.

As a writer, his works must speak for him; as a man, his character will be always remembered by those who knew him with affectionate regret. He has been described by others, and has even described himself, as being vain; but his vanity was of that playful kind, and so remote from all wish to depress others, that no one, whose temper was not sour indeed, could possibly have been offended with it. He had his foibles; who has them not? His fondness for social conviviality sometimes led him into excess, but his principles were always untainted. In politics, he was at once a steady royalist and an ardent friend of genuine liberty. In religion, he was from thorough conviction a member of the English church; but intolerance, or enmity towards those who differed from him, would have been totally inconsistent with his mild disposition. "I can drink, I can laugh, I can converse," as he tells us, "in perfect good humour, with Whigs, with Republicans, with Dissenters, with Independents, with Quakers, with Mora-

Boswell.

vians, with Jews. They can do me no harm: my mind is made up: my principles are fixed; But I would vote with Tories, and pray with a Dean and Chapter." Such was his good humour, that Mr Burke remarked, he had so much of it naturally that it was scarcely a virtue. His lively and fertile mind, and his rich fund of anecdote, made him an inimitable companion. The old, the young, the grave, and the gay, were all equally fascinated and borne away by the irresistible hilarity of his manner. His heart was harmless, and his benevolence active. Let us add to him that praise, without which all other praise must be wretchedly imperfect,—he lived and died a sincere and humble Christian. (F)

BOSWORTH, Battle of. See Britain, *Index.*

Fig. 2. View of the lower part of Mr Troughton's Portable Barometer.
Fig. 3. Perspective view of Mr Troughton's Portable Barometer, when mounted on its stand or staff.
Fig. 4. View of the whole instrument when packed up within its stand.
Fig. 5. View of the structure of the Staff Head upon which the Barometer is suspended.
Fig. 6. View of a Barometer constructed by Messrs Miller and Adie of Edinburgh.
Fig. 7. Perspective view of Mr Troughton's Marine Barometer.
Fig. 8. View of the Gimbals upon which the Marine Barometer is suspended.
Fig. 9. Section of the lower part of the Marine Barometer.
Fig. 10. Perspective view of the upper part of the Marine Barometer.
Fig. 11. View of the Wheel Barometer invented by Dr Hooke.

PLATE LV.

Figs. 1, 2, 3, Represent the Dash Wheel, used for washing in the operation of Bleaching.
Fig. 4. End view of the Squeezers, as constructed by Mr Parkinson of Manchester.
Fig. 5. Front view of the Squeezers.
Fig. 6. Represents a side view of the wash Stocks which are used in Bleaching, to free the goods from the loose stuff which may be attached to them.
Fig. 7. Represents an end view of the same wash Stocks.

PLATE LVI.

Fig. 1. No. 1st and 2d represent Sections of Stone Boilers for the recovery of waste alkali.
Fig. 2, 3. View of a Bucking Apparatus used in Bleaching, and invented by Mr John Lourie, of Glasgow.
Fig. 4. View of an Apparatus for making the Oxymuriatic Acid, invented by Mr Peter Fisher of Rutherglen.

PLATE LVII.

Fig. 1, 2. Views of a *Snatch Block*, which is used for heavy purchases.
Fig. 3. View of the *Long Tackle Block*.
Fig. 4. Perspective View of the *Boring Machine*, employed for boring the hole for the centre pins of blocks, and a hole for the commencement of the mortise which contains the sheave.
Fig. 5. Perspective View of the *Corner Saw* for cutting off the corner of the solid parallelopipedons after they have been bored.

PLATE LVIII.

Fig. 1. View of the *Clue-line Block*, invented by Mr Brunel.
Fig. 2. View of the *Shoulder Block*.
Fig. 3. View of the *Spring Block*, invented by Mr Hopkinson of Philadelphia, for assisting a vessel in sailing, by increasing the acting spring of her rigging.
Fig. 4. Perspective View of the *Mortising Machine*, for mortising out the cavities for the reception of the sheaves of the blocks.

PLATE LIX.

Perspective View of the *Shaping Engine*, for forming the outside of the blocks to their proper figure.

PLATE LX.

Fig. 1. Perspective View of the *Scoring Engine*, for forming a groove round the longest diameter of the block, for the reception of the strap.
Fig. 2. Perspective View of the *Crown Saw*, for cutting out a circular piece of wood, and at the same time forming a hole exactly in the centre of it.

PLATE LXI.

Fig. 1. Perspective View of the *Coaking Engine*, for forming a cavity in the form of three small semicircles in the centre of the sheave, for the reception of the coak or metal bush.
Fig. 2. Perspective View of the *Face turning Lathe*, for turning perfectly flat the faces of the metal coak and of the block.

PLATE LXII.

Fig. 1. View of Cronstadt's Blow-pipe.
Fig. 2. Blow-pipe said to be invented by Dr Black.
Fig. 3. Newly invented Blow-pipe.
Fig. 4. Dr Wollaston's portable Blow-pipe.
Fig. 5. Blow-pipe with a cylindrical Box and moveable Jet.
Fig. 6. View of the Platina Spoon for holding the object.
Fig. 7. Perspective View of Professor Pictet's Alcohol Blow-pipe.
Fig. 8. Perspective View of Mr Benjamin Hooke's Alcohol Blow-pipe.
Fig. 9. New Blow-pipe, invented by the Author of the Article, and constructed upon the principle of the blowing engine.
Fig. 10. View of the Nose Pipes used in the experiments made at the London Philosophical Society, with blow-pipes acting with oxygen gas.

PLATE LXIII.

Fig. 1. Perspective View of the Blowing Engine Cylinder and Water Regulator, for projecting, with great force, a continued stream of air into furnaces, for the purpose of increasing the combustion.
Fig. 2. View of the Valves.

PLATE LXIV.

Fig. 1. Elevation of a Mill for putting in Motion two Boring Engines.
Fig. 2. A longitudinal Section of the Cutters employed in boring.
Fig. 3. A transverse Section of the Cutter.
Fig. 4. View of the Cutter fixed upon the Axis.
Fig. 5. A perspective View of the Boring Machine in the act of boring out a cylinder for a steam engine.

PLATE LXV.

Fig. 1. to 21. Diagrams for illustrating Boscovich's Theory of Natural Philosophy.

NOTICE TO SUBSCRIBERS.

Owing to the peculiar difficulties which we had to encounter, in obtaining the new and valuable drawings of the Block Machinery at Portsmouth, it has been out of our power to get ready, for the present volume, the Engravings of Plates LVIII., LIX., and LXI. They shall be given, however, in the next half-volume, along with the Plates for the article Botany, with which the Fourth Volume commences.

ERRATA.

Page 213.	col. 1.	line 41.	For *three inches* read *three-tenths of an inch*,
213.	1.	49.	For *pillow* read *pillar*.
213.	2.	10.	For *beam and the slider q, and moved*, &c. read *beam, and the slider q moved* &c.
326.	1.	31.	For *friend* read *mind*.
608.	2.	29.	For *runs* read *rims*.
*609.	1.	5.	For *centre-bit* read *drill*.
613.	2.	8.	from bottom. For *towards* read *fr*
638.	2.	26.	For *resist* read *revive*.

END OF VOLUME THIRD.

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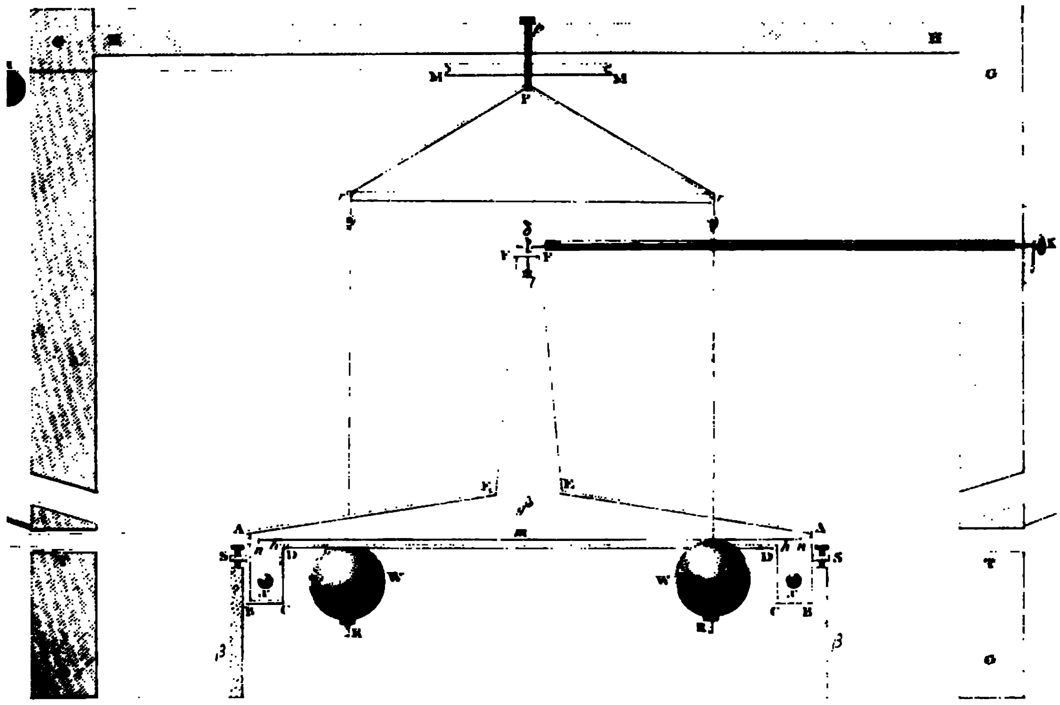
Fig. 2.



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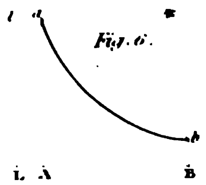

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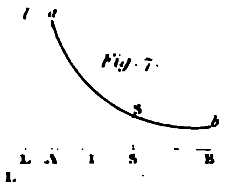

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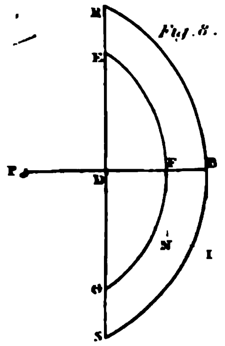

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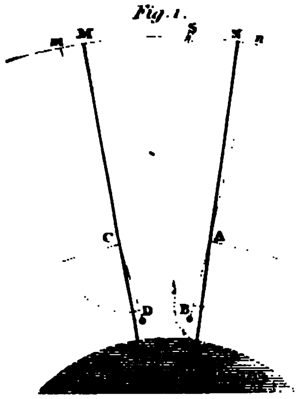

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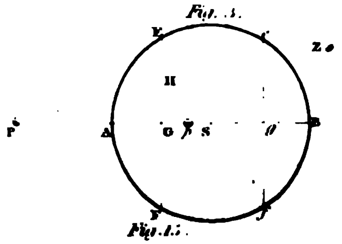

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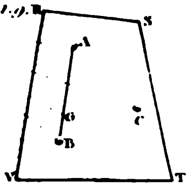

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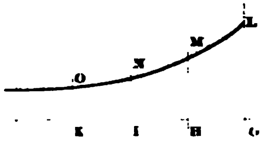

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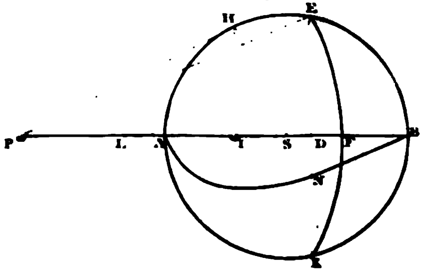

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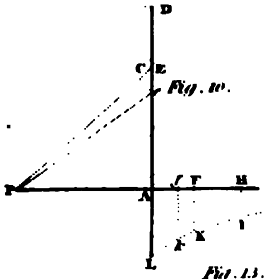

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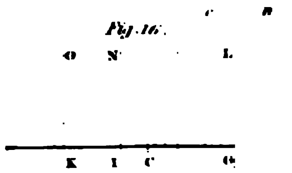

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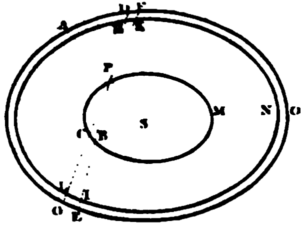

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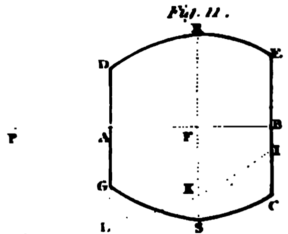

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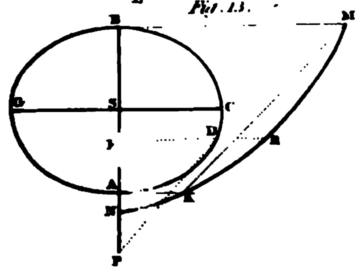

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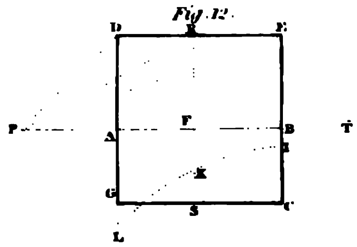

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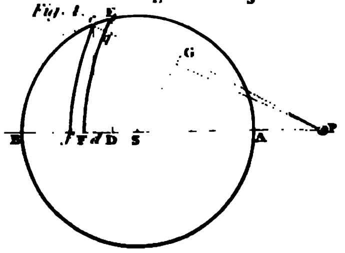


Kirkwood sculp^t Edin^r

ATTRACTION PLATE I.

Fig. 1.

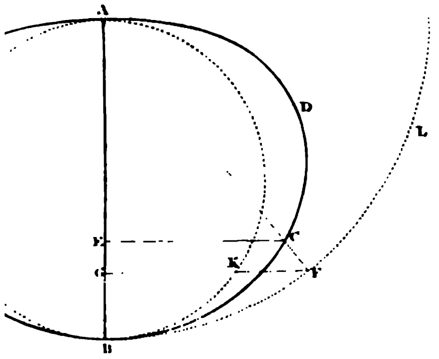
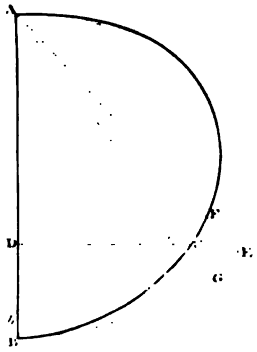


Fig. 2.



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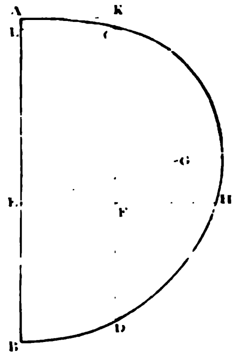

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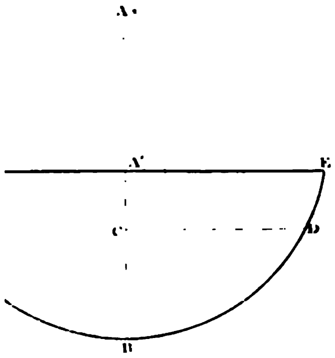

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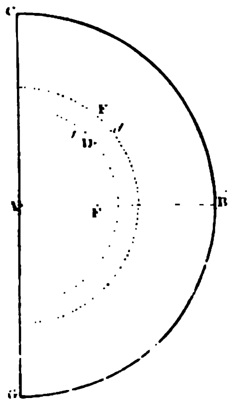

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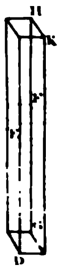
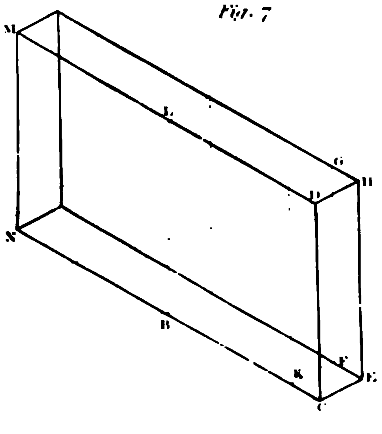


Fig. 7



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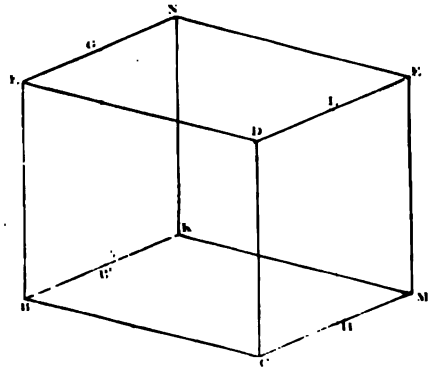


[illegible]

BALANCE.

Fig. 1.

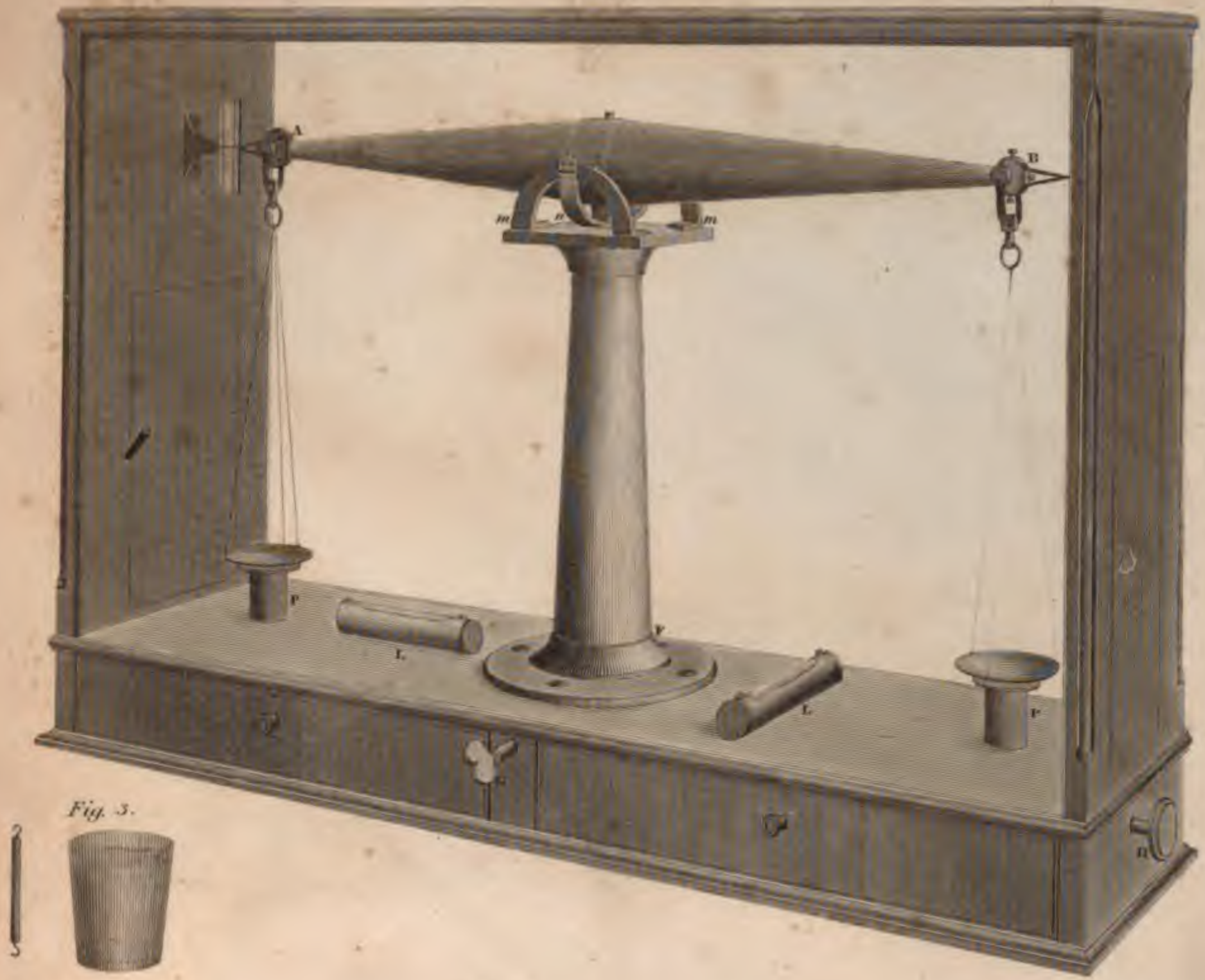
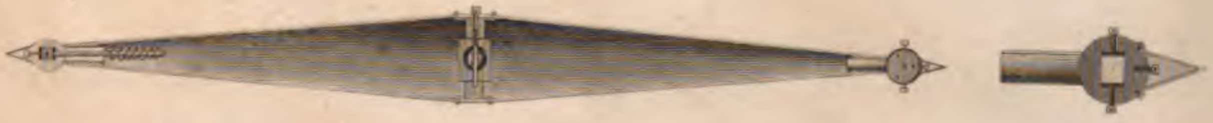


Fig. 3.

Fig. 2.



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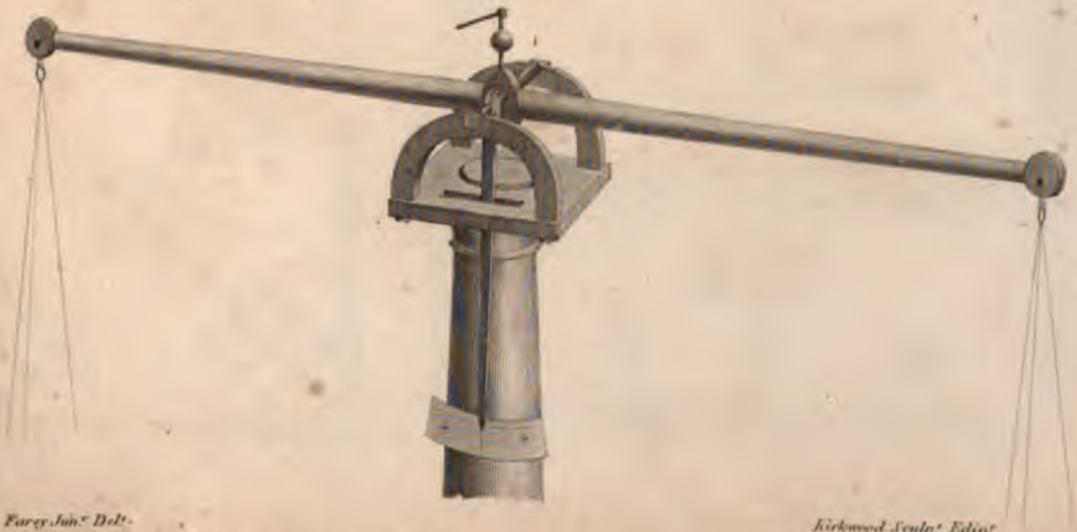
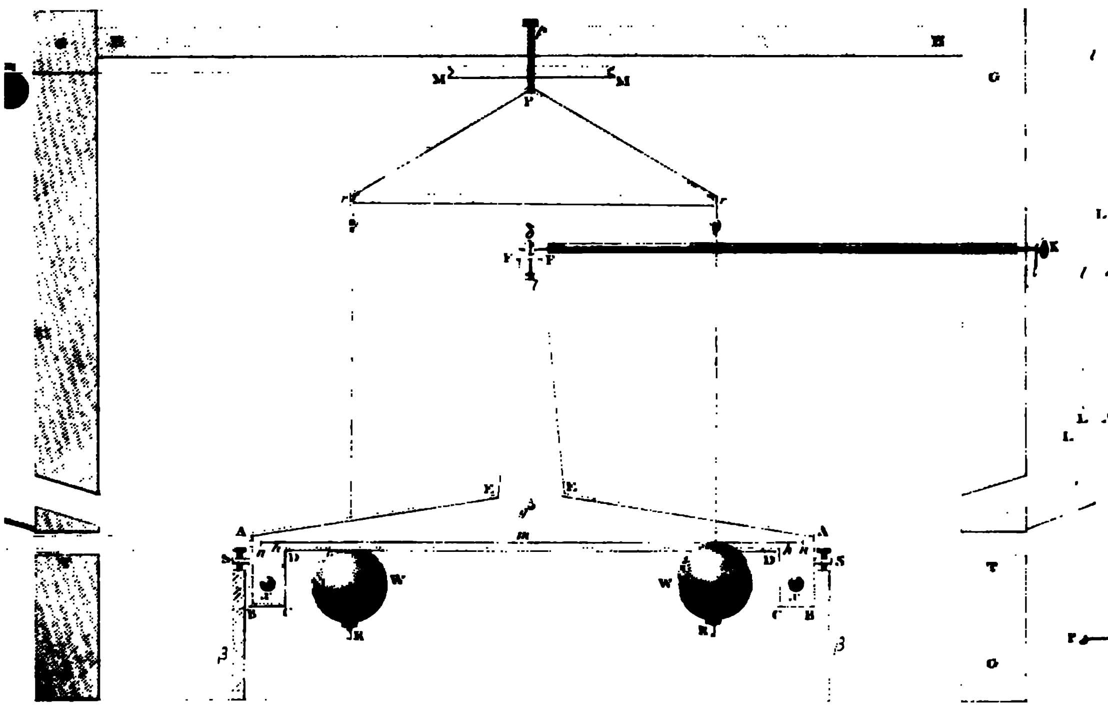


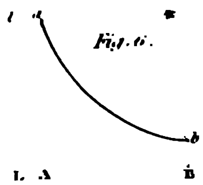
J. Farey Jun.r Del.t

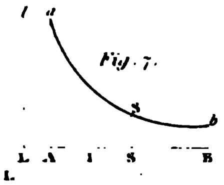
Kirkwood Sculp.t Edin.r

ATTRACTION. PLATE XLIX.

Fig. 2.







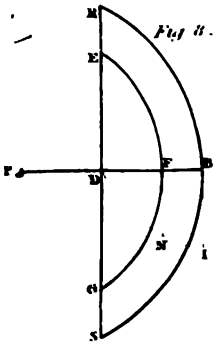
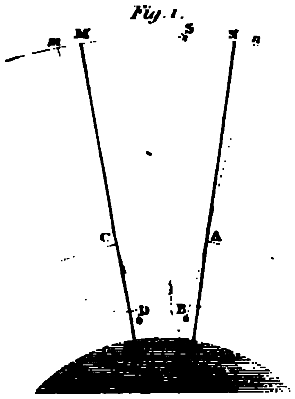


Fig. 1.



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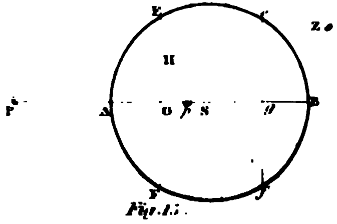

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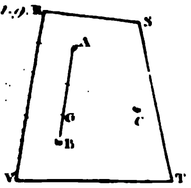

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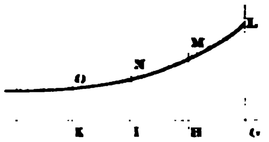

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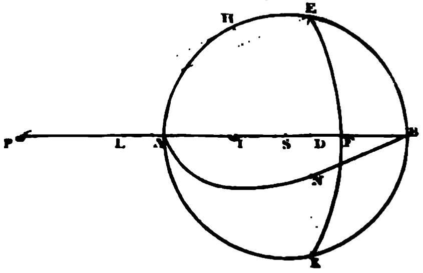

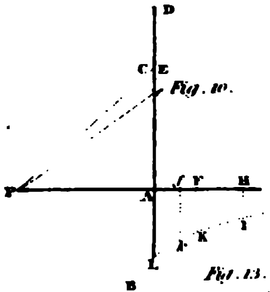

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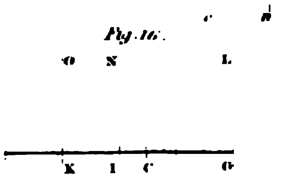

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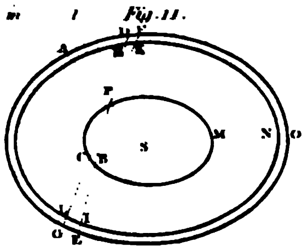

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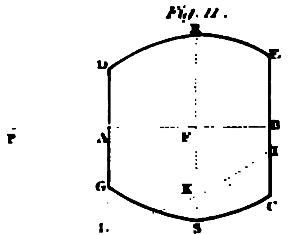

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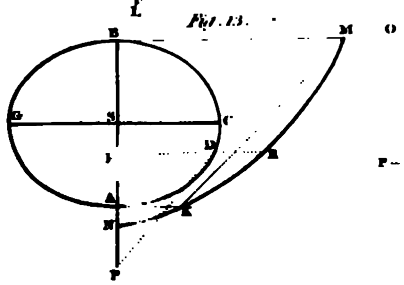

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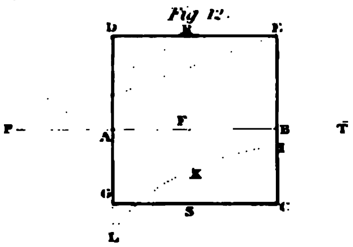
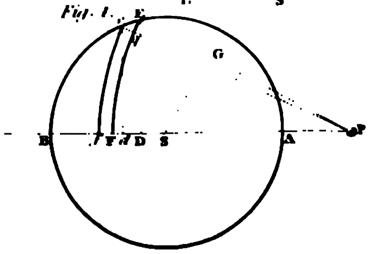


Fig. 4.



Kirkwood sculp' Edin'

Fig. 1.

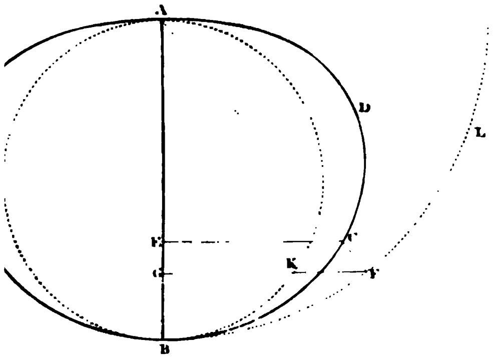
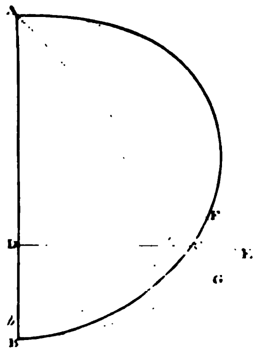


Fig. 2.



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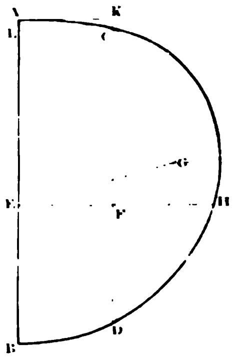
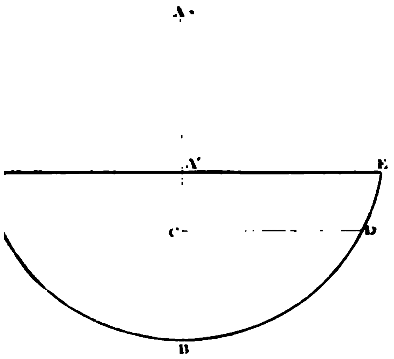


Fig. 3.



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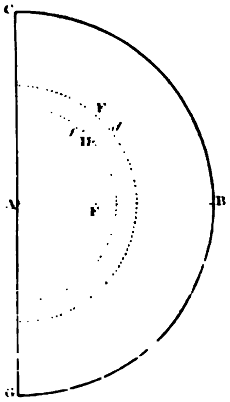

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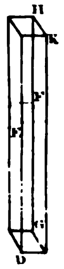
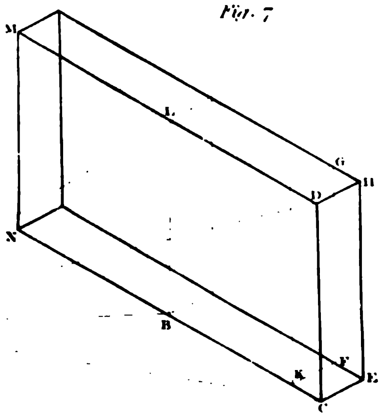


Fig. 7



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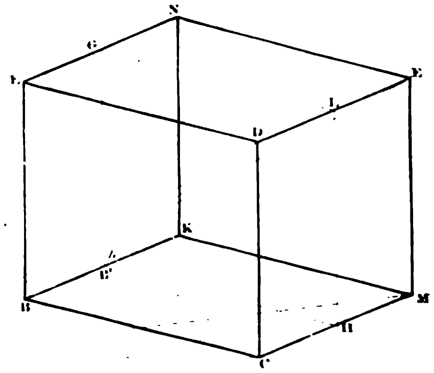


Kirkwood sculpt Edin

J. Lacy
W. Plummer

BALANCE.

Fig. 1.

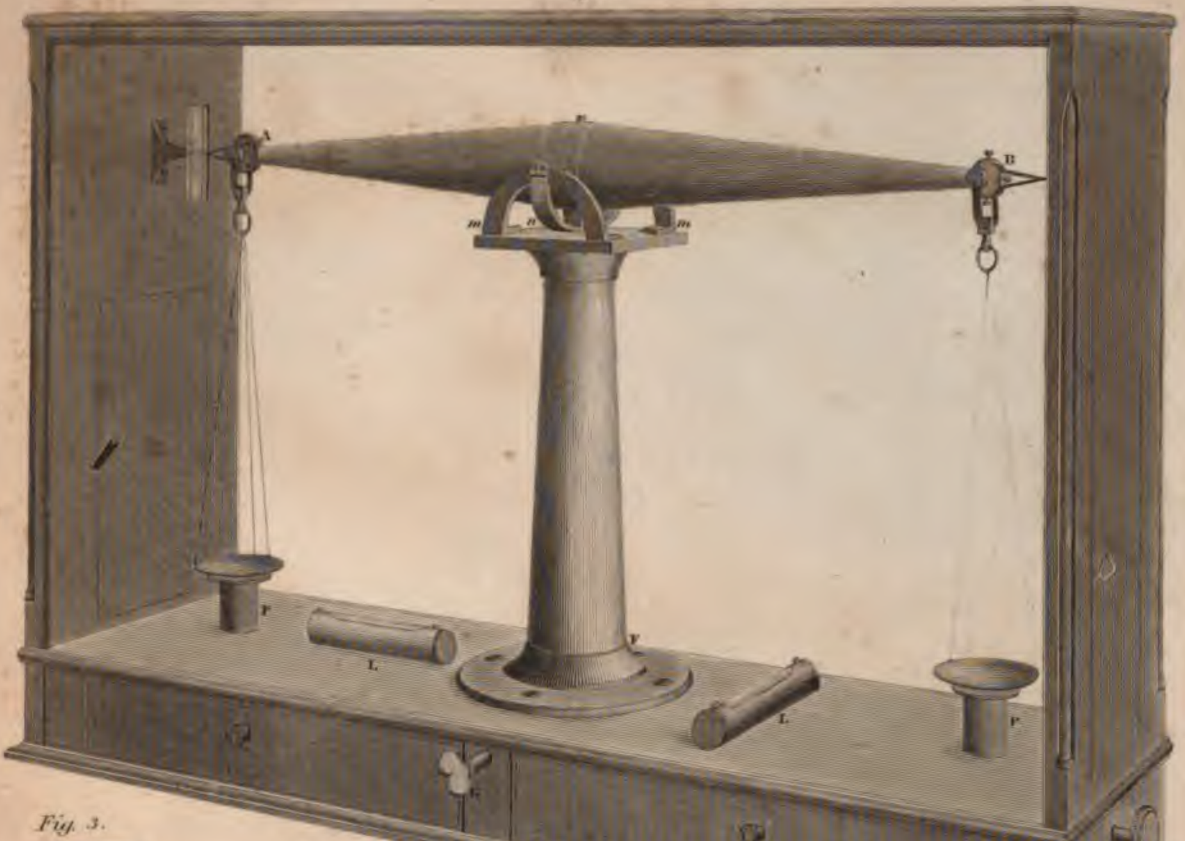
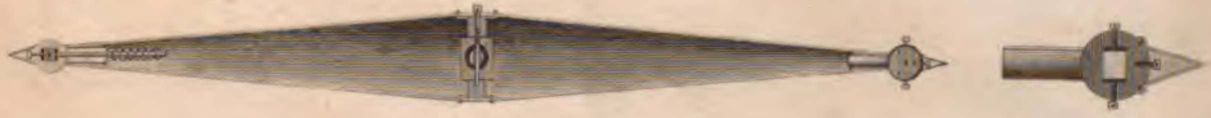


Fig. 3.

Fig. 2.



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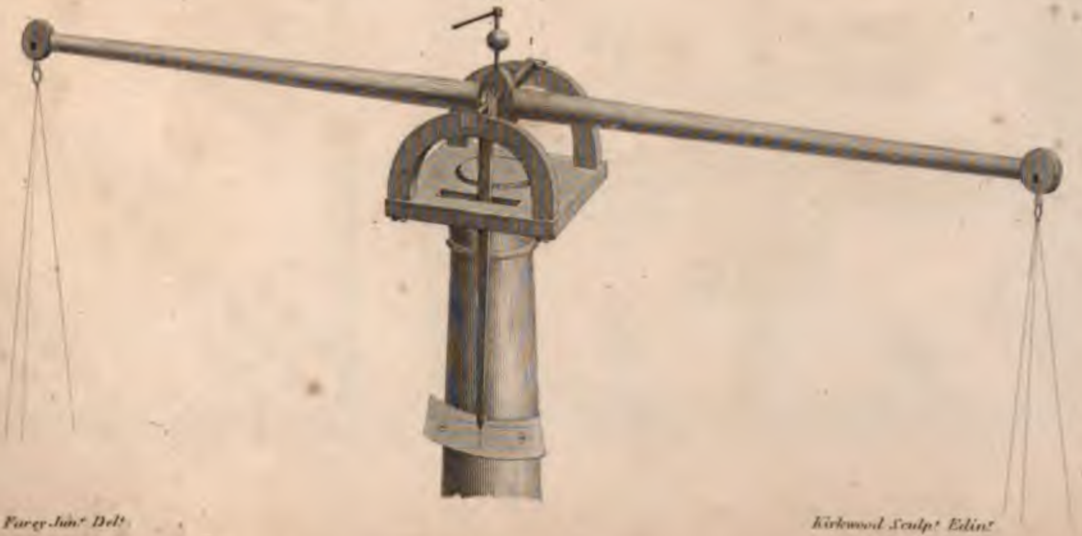
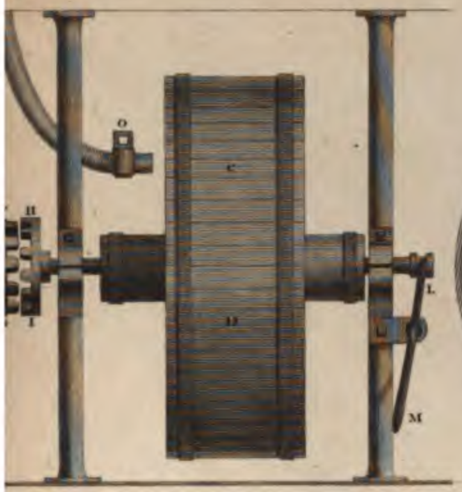


J. Farey Junr Delt

Kirkwood Sculpt Edinr

Fig. 1.



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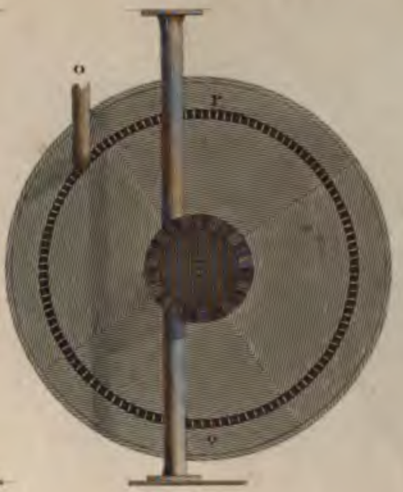

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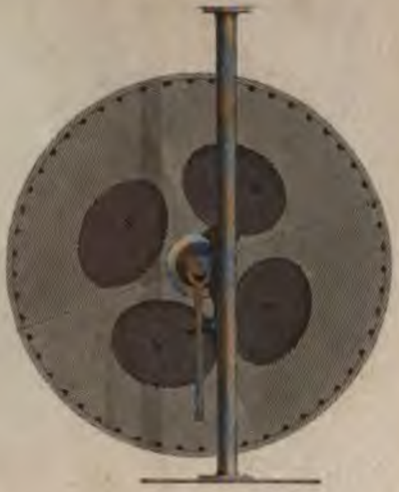

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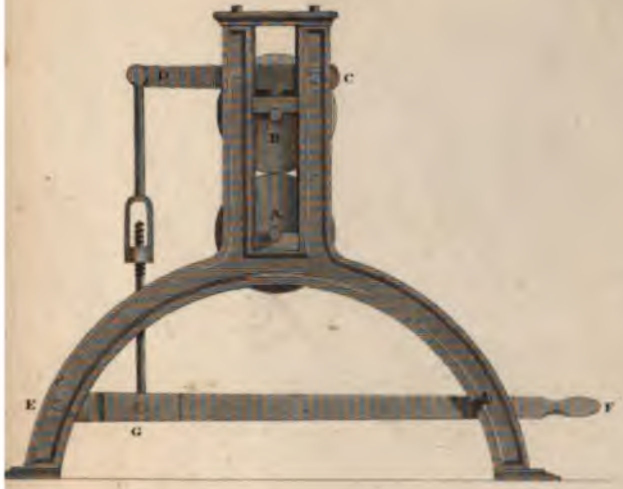

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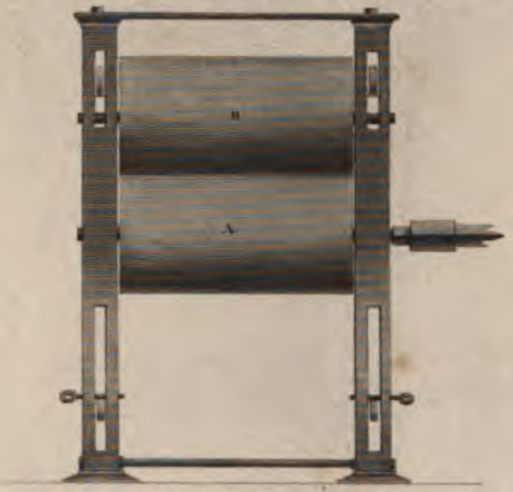

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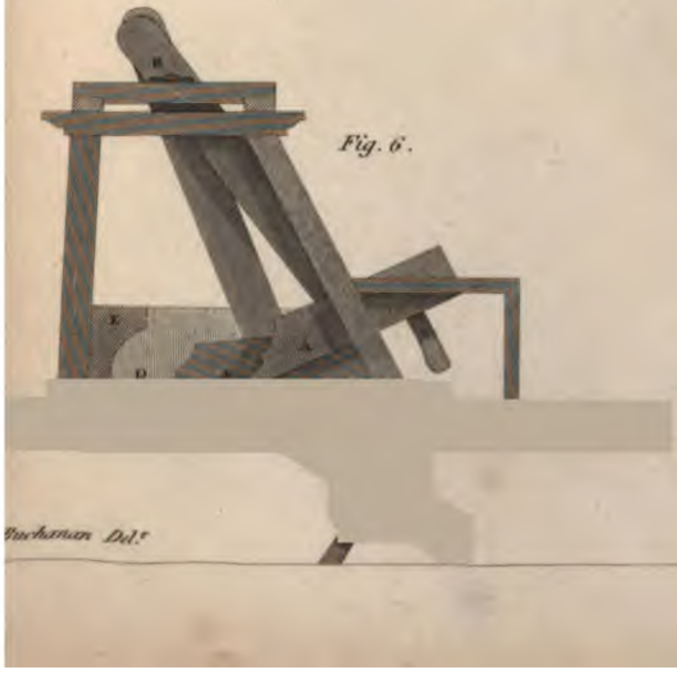

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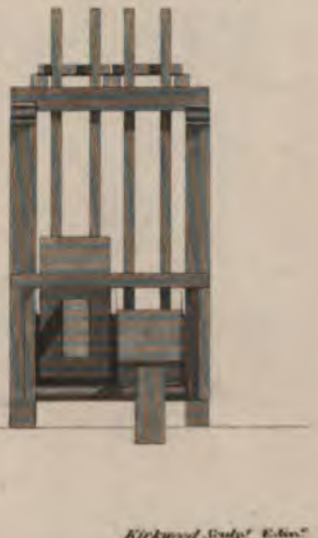
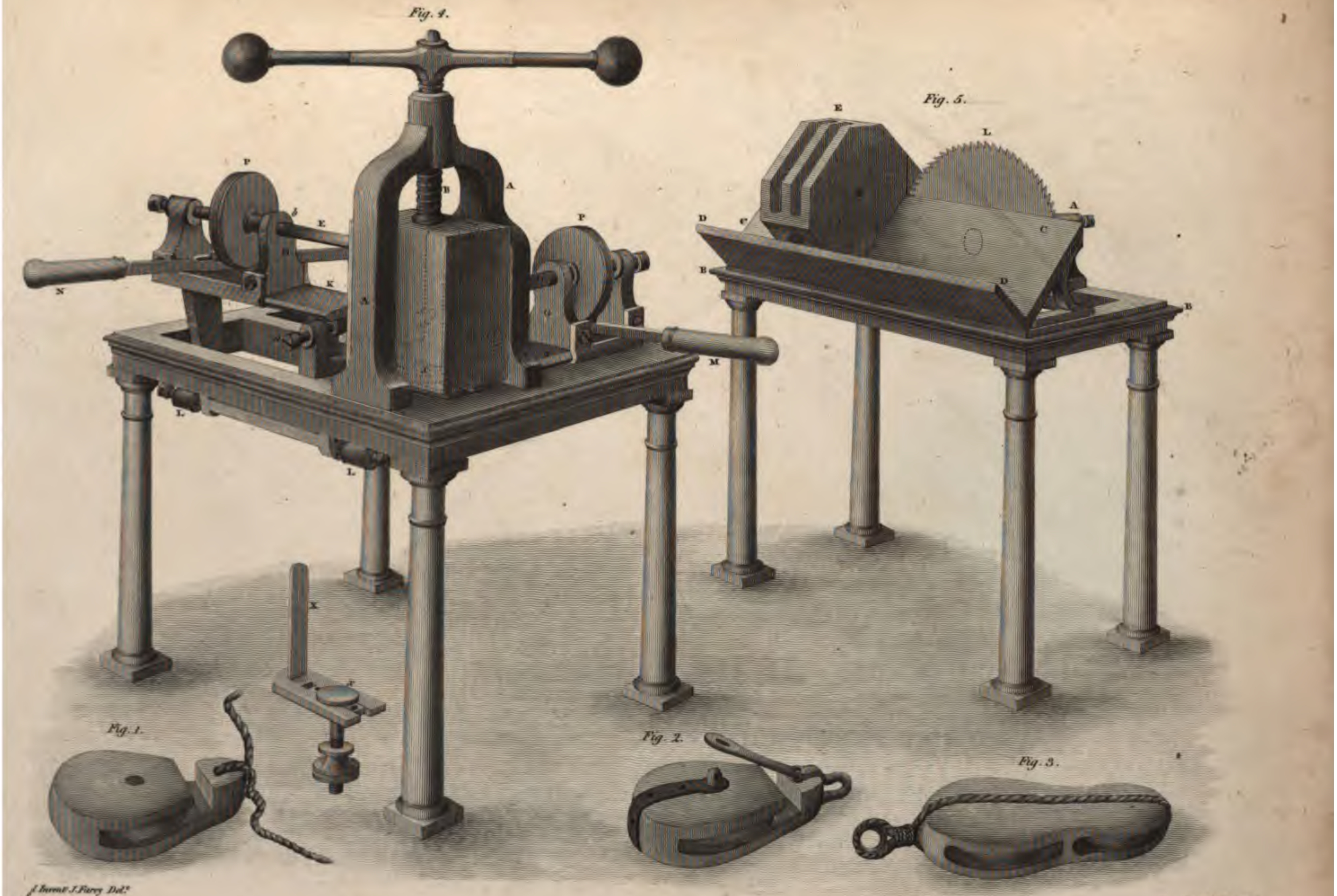


Buchanan Del^r

Kirkwood Sculp^t Edin^r

MACHINERY. PLATE LVII.



J. Barrow & J. Farey Delt. Engd. by J. Moffat Edin.r

BLEACHING PLATE LVI.

Fig. 1st

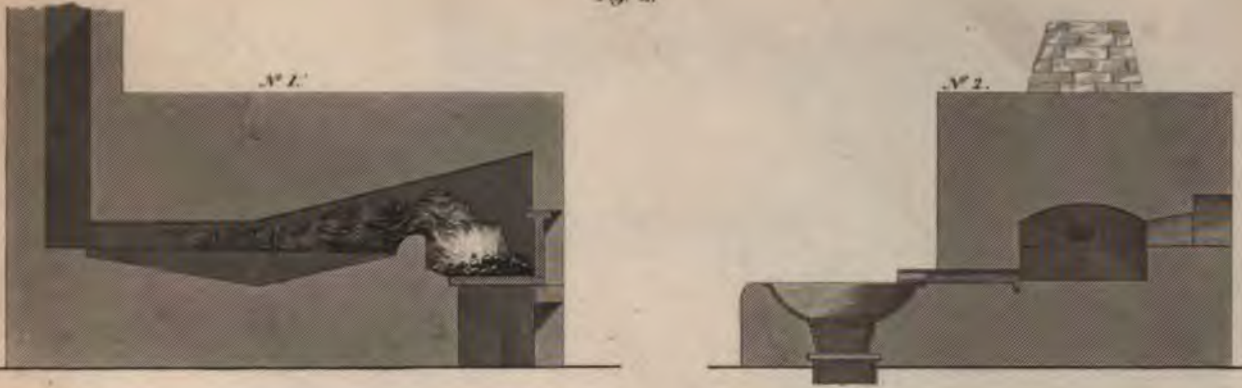


Fig. 2d

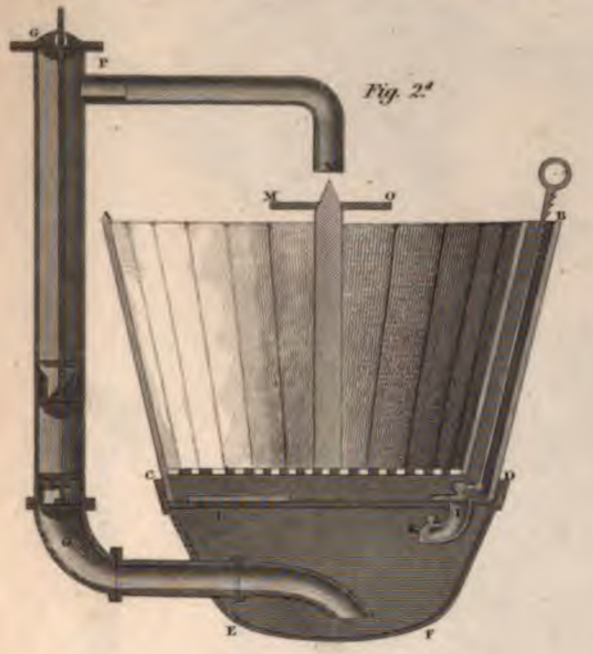


Fig. 3d

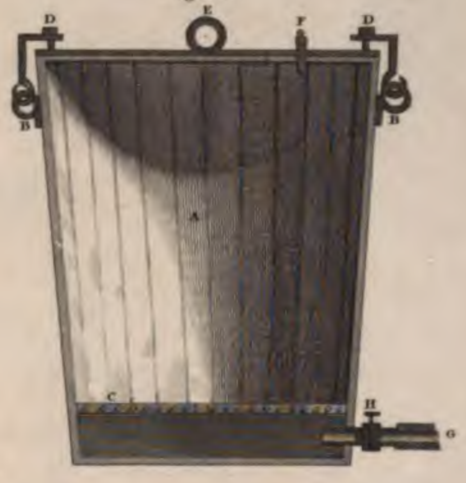
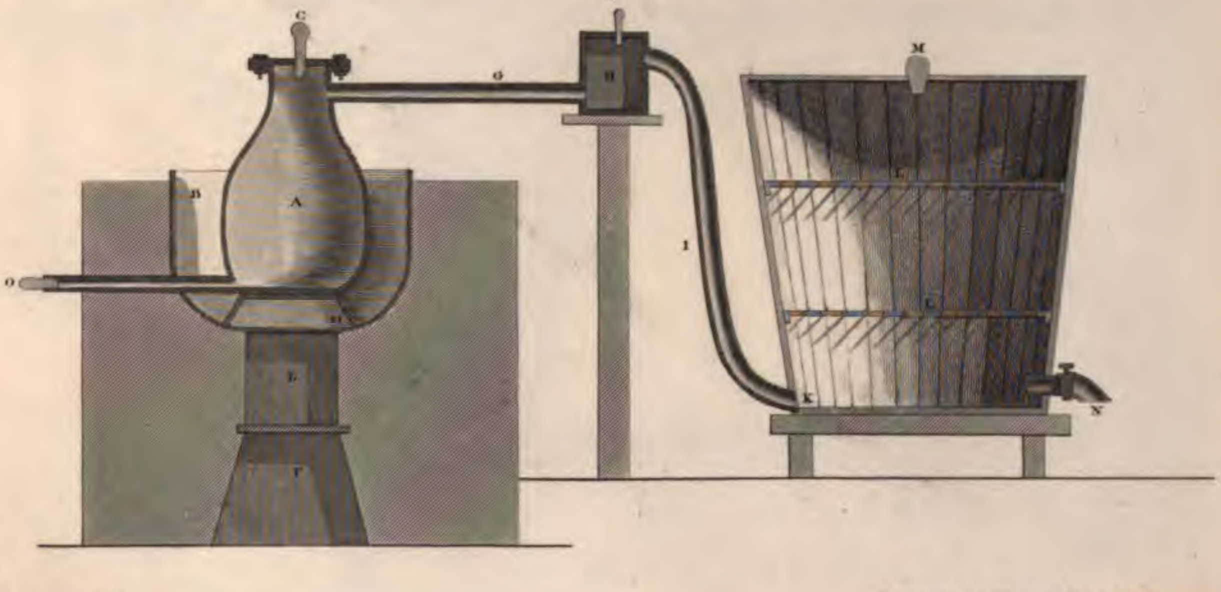


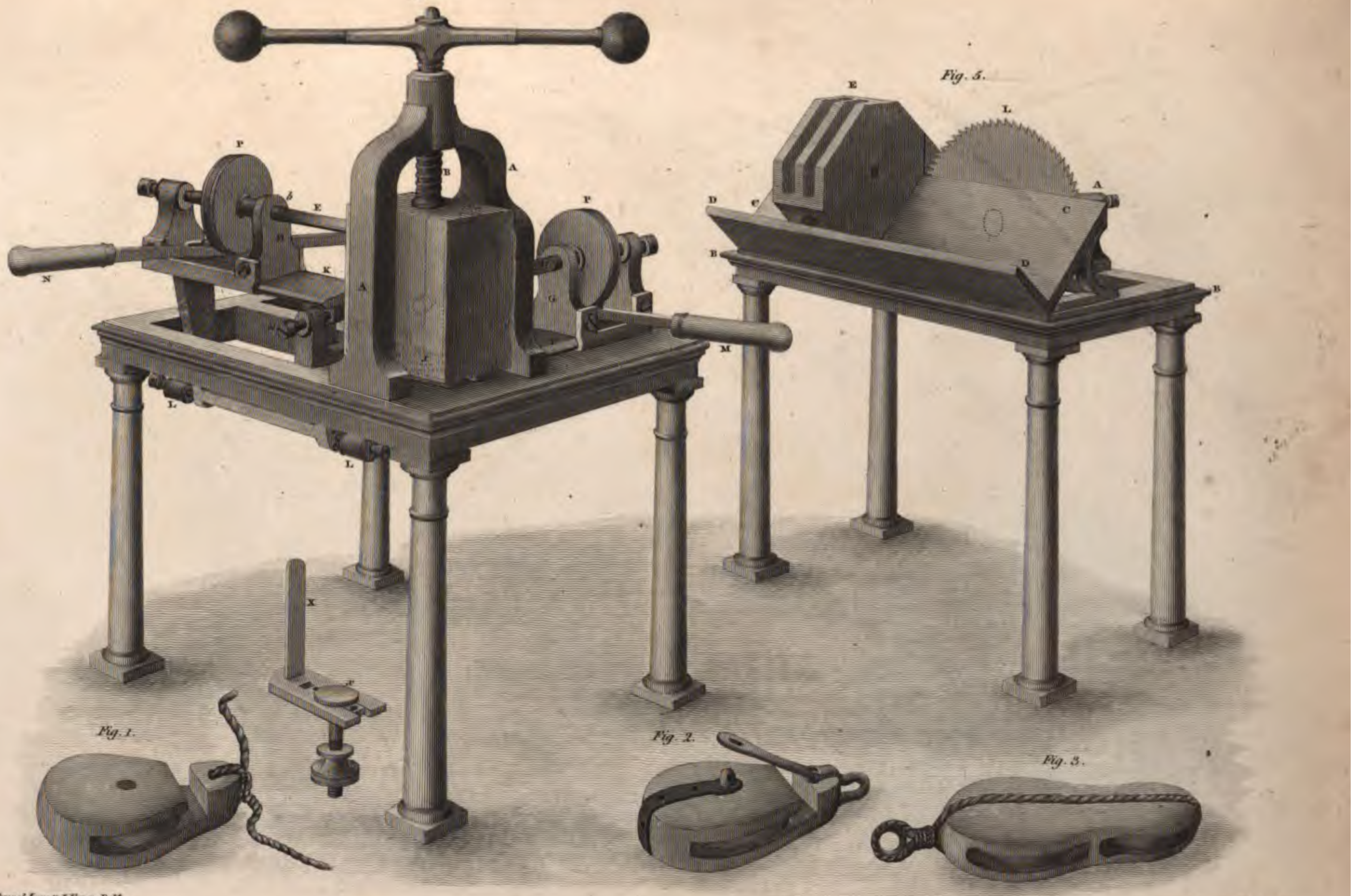
Fig. 4th



Robertson Buchanan Del.t *Engraved by Kirkwood & son Edin.r*

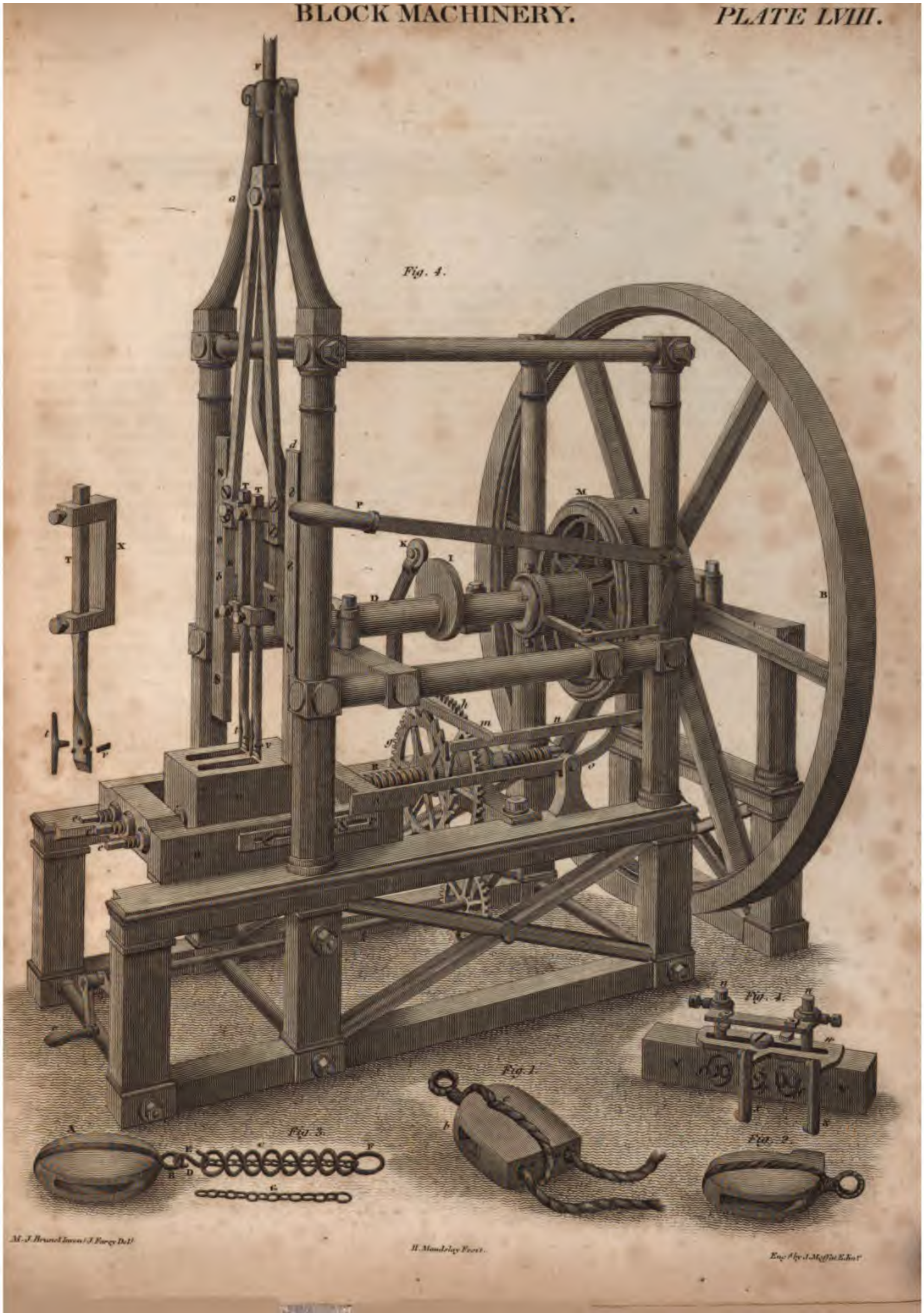
BLOCK MACHINERY.

PLATE LVII.



M. I. Brunel Invent.r J. Farey Del.t

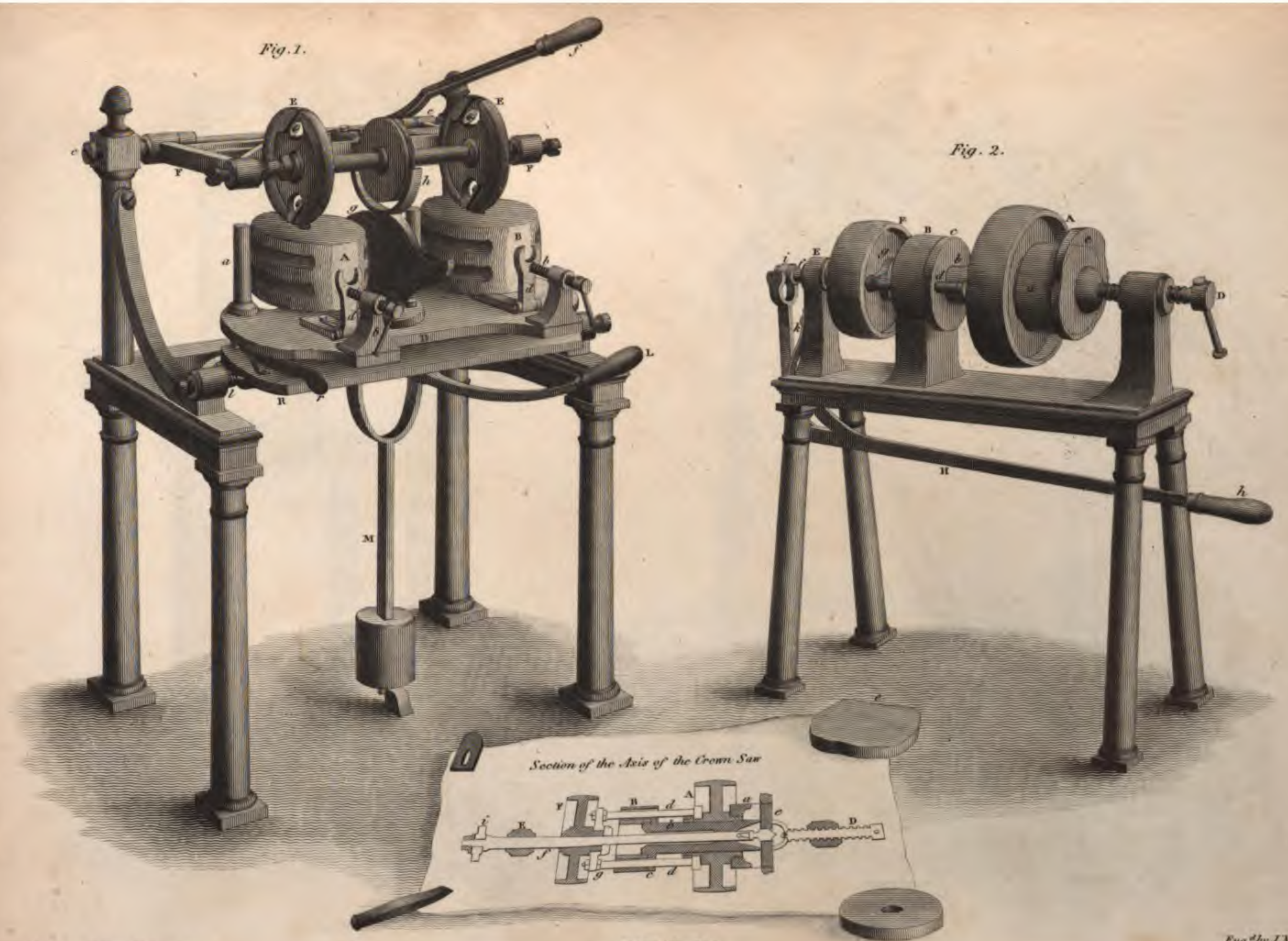
Eng.d by J. Moffat Edin.r



M. J. Brunel Invent. J. Farey Del.

H. Maudslay Fecit.

Eng.d by J. Moffat E. Ext.



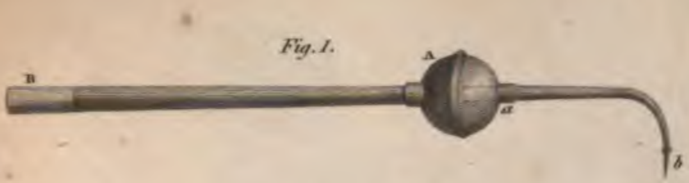
M. J. Brunel Invent. J. Farey Del^{t}

H. Maudslay Fecit.

Eng^{d} by J. Moffat Edi

BLOW-PIPE.

Fig. 1.



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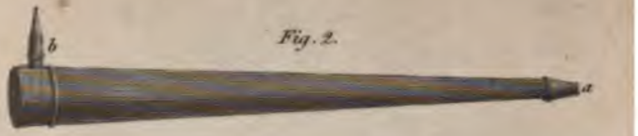

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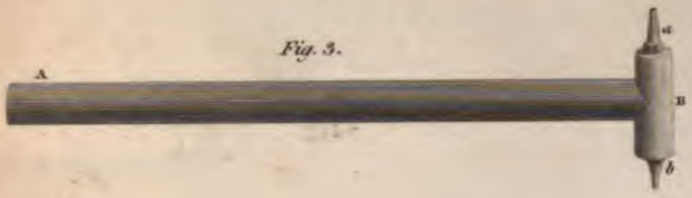

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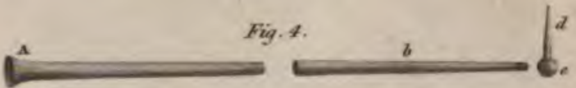

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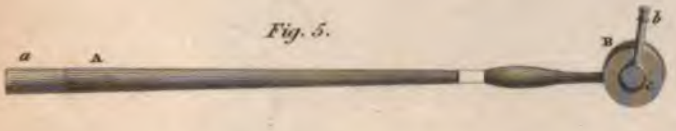

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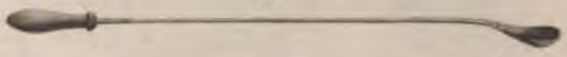

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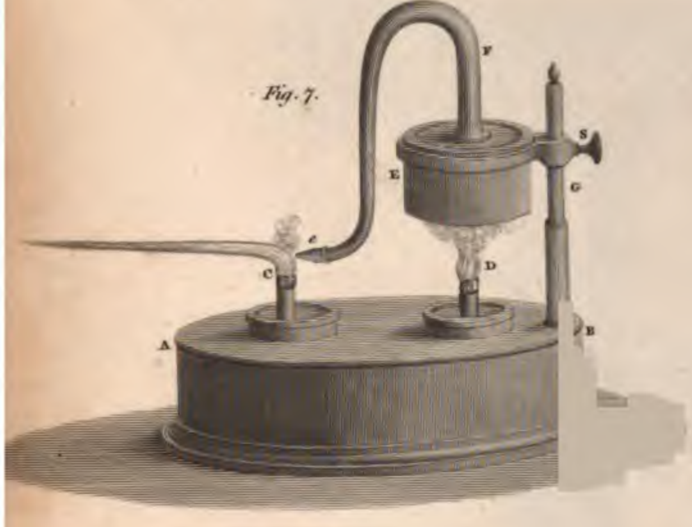
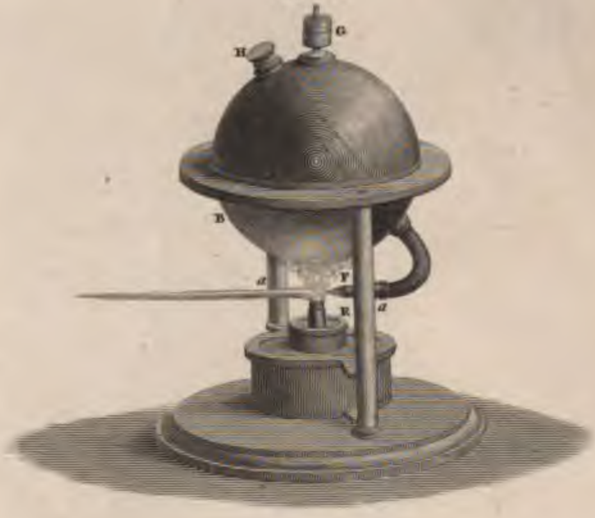


Fig. 8.



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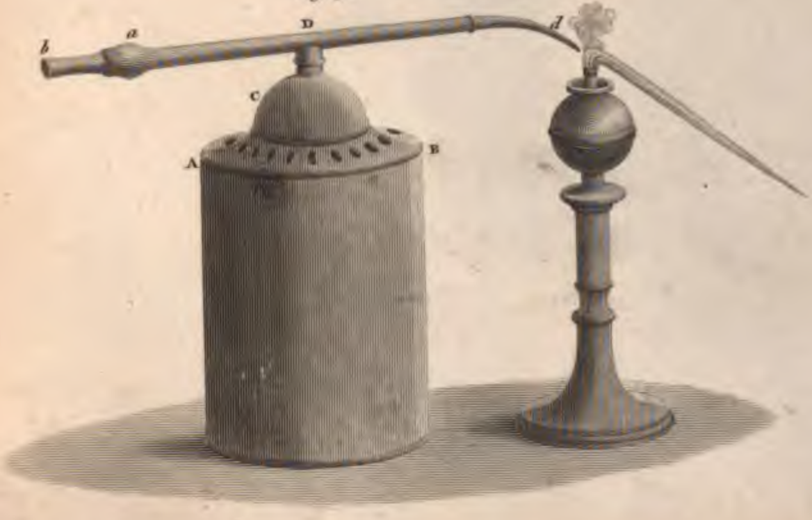

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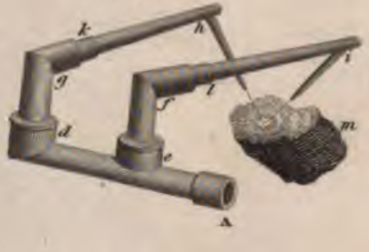


J. Farey Delt.

Engd by J. Moffat Edinr.

BLOWING ENGINE

PLATE LXIII.

Fig. 1.

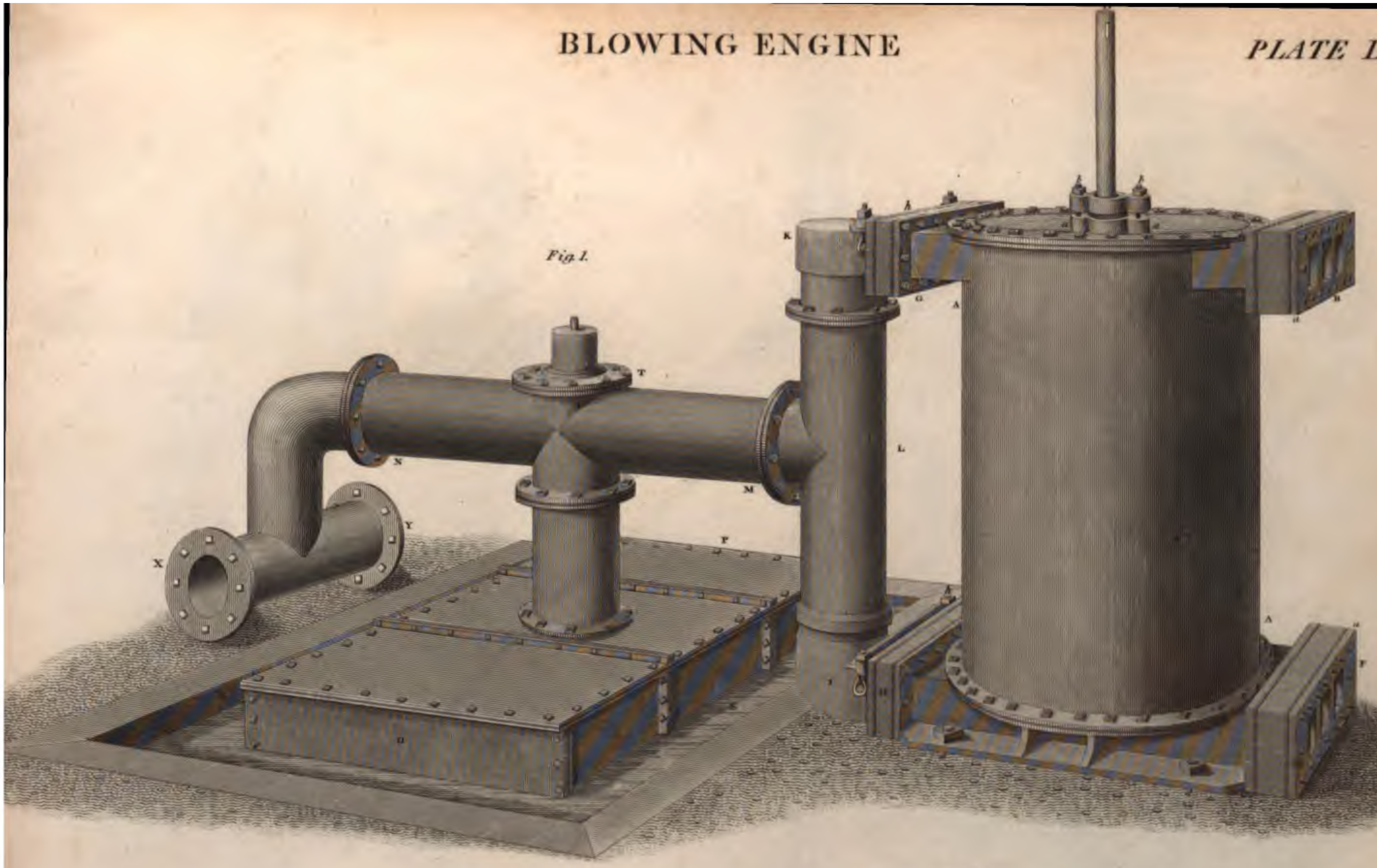
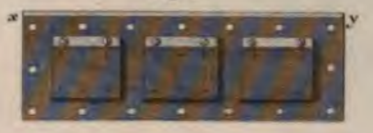


Fig. 2.



J. Farey Junr Delt

Kirkwood Sculpt Edinr

BOSCOVICH'S THEORY.

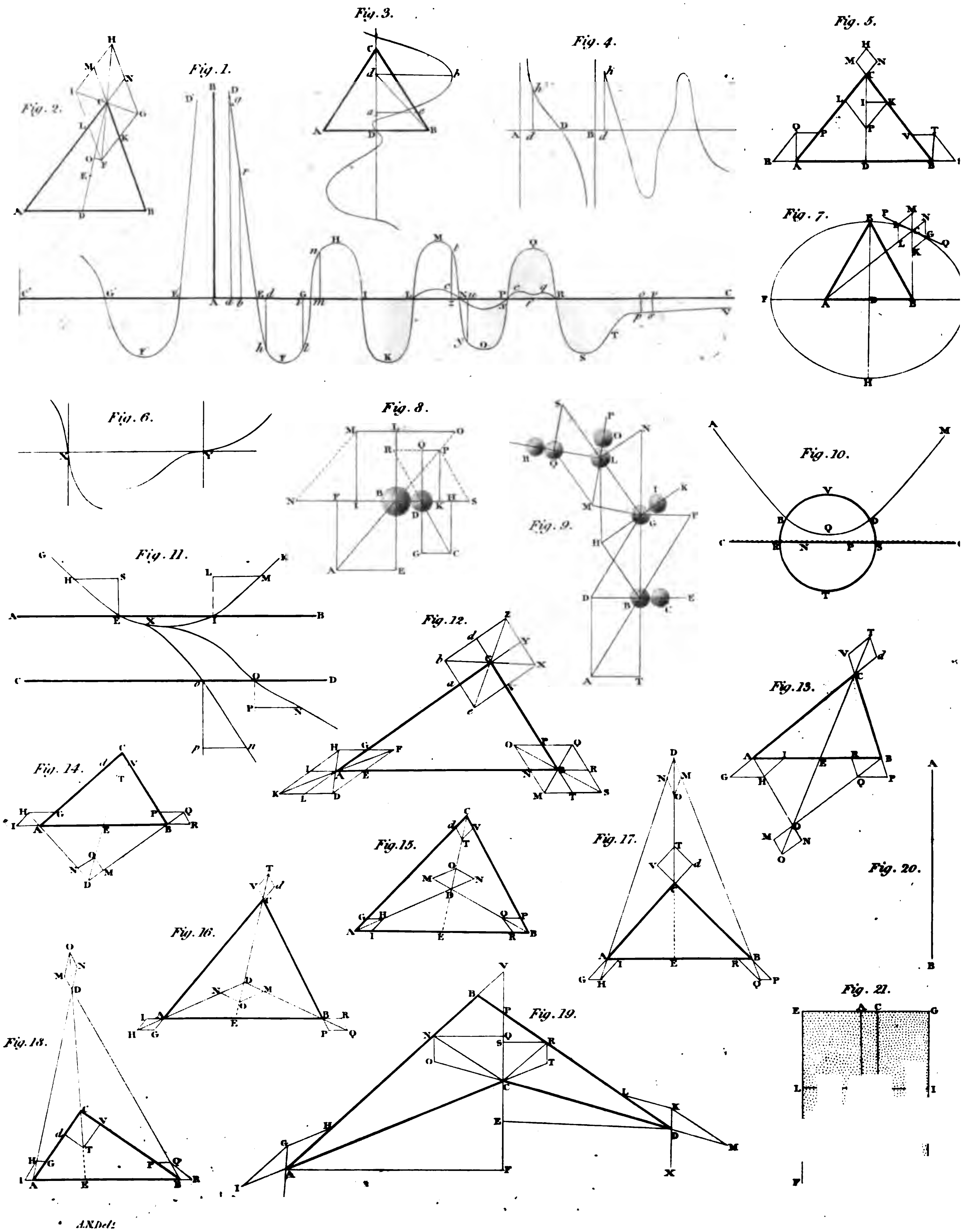


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.

A.X.Del.